



Student Handbook

Bachelor of Manufacturing and Industrial Technology

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Compiled by
Faculty of Engineering and Technology,
Tunku Abdul Rahman University of
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Contents

Part A.	General Information	1
1.	Background and Overview of Faculty of Engineering and Technology	1
2.	Programmes Offered in the Faculty/Department	1
3.	Organisation Chart	2
4.	Staff Listing.....	2
5.	Progression Route.....	2
6.	Minimum Entry Requirements	3
7.	Intra and Inter Faculty Transfer.....	3
8.	Lecture and Tutorial Plan.....	3
9.	Academic Calendar	3
10.	General Information	3
10.1	Important Information on Notice Board and Intranet.....	3
10.2	E-Learning System & University E-Mail	3
10.3	Change of Address or Contact Number	4
10.4	Student Time Table.....	4
10.5	Tutorial Groups	4
10.6	Consultation Hours	4
10.7	Attendance (Lectures, Tutorials and Practical).....	4
10.8	Application for Leave of Absence.....	4
10.9	Reinstatement, Deferment, Withdrawal of Studies	4
10.10	Student Dialogue	5
10.11	Online Course Evaluation Survey	5
10.12	Online Tracer Study	6
10.13	Rules and Conduct in Laboratories	6
10.14	Office Matter	6
10.15	Students Attire	6
11.	Evaluation and Assessment	6
11.1	Assessment Components	6
11.2	Coursework Assessment	6
12.	Examinations.....	7
12.1	Grading System and Examination Rules.....	7
12.2	Candidate Academic Status	8
12.3.	Maximum Duration of Study	9
12.4	Award of Diploma.....	9
12.5	Classification of Awards.....	9
12.6	Extenuating circumstances which may affect a candidate's examination performance	9
12.7	Appeal for Review of Examination Results.....	9
12.8	Repeat/Resit Application.....	10
12.9	Online Course Registration / Add and Drop Courses	10
12.10	Examination Requirements.....	10
12.11	Cheating in the Examination	10
13.	Bursary	10
13.1	Payment of Fees.....	10

13.2	Online Printing of Semester Tuition Fees.....	11
13.3	Refund of Fees	11
13.4	Fees for Resit Examination and Repeating Courses.....	11
14.	Financial Aid.....	11
14.1	Scholarships, Bursary and Grants.....	11
14.2	Student Loans.....	11
14.3	PTPTN.....	12
15.	Computer Services and Facilities	12
15.1	Communication and Information Technology (CIT) Centre	12
15.2	Computer Aided Design (CAD) Centre	12
16.	Library	12
16.1	Academic Resources	12
16.2	Facilities and Services	12
16.3	Library Induction Programme.....	13
16.4	Opening Hours.....	13
17.	Student Services	13
17.1	Accommodation	13
17.2	TAR UMT Campus Hostel Accommodation	13
17.3	Sport and Recreation.....	13
17.4	Sport Complex and Clubhouse	14
17.5	Canteen Facilities	14
17.6	University Bus Services	14
17.7	Students' Insurance Scheme	14
17.8	Student Counseling Services	15
17.9	Student Development and Career Services	15
17.10	Clubs, Societies and Committees	15
17.11	Study Abroad Unit (SAU).....	15
18.	Personal Data Protection Act (PDPA) Statement	15
19.	Miscellaneous	15
Part B.	Programme specific information	16
	Diploma of Product Development Technology	Error! Bookmark not defined.
1.	Programme Aims.....	16
2.	Programme Educational Objectives (PEO).....	16
3.	Programme Outcomes (PO).....	16
4.	DISCLAIMER.....	17

Part A. General Information

1. Background and Overview of Faculty of Engineering and Technology

Formerly known as Faculty of Engineering and Built Environment (FEBE) began as the School of Technology (SOT) which was set up in 1972. It was split into two faculties, namely Faculty of Engineering and Technology (FOET) and Faculty of Built Environment (FOBE) in May 2017. The programmes conducted in FOET are designed in such a way that would prepare students to register their Professional Membership with professional bodies locally and internationally in particular Board of Engineers Malaysia (BEM), Institution of Engineers, Malaysia (IEM), Engineering Councils (EC), Malaysia Board of Technologists (MBOT) etc. for engineering and technology programmes. The aim of FOET has always been to BUILD YOUR DREAMS AND ENGINEERING YOUR FUTURE, ensuring your dreams fulfilled and your future secured. Currently, there are 3 departments in FOET, namely

- Department of Electrical and Electronics Engineering
- Department of Mechanical Engineering
- Department of Manufacturing Technology

In Faculty of Engineering and Technology, we provide

- State-of-the-art Laboratories equipped with industry standard equipment
- Holistic education with the focus on strong technical skill and development to be a professional
- A comprehensive coverage of programmes in both the Engineering and Built Environment field
- Qualified and Dedicated staff who are committed to BUILDING YOUR DREAMS AND ENGINEERING YOUR FUTURE
- Projects and assignments that focuses on real industrial problems with industrial training that provides a taste of working on actual industrial problems and solution
- Extensive links with industry as well as having graduates who are captains of their industries
- Programmes which are well accepted by institution around the world resulting in a wide range of progression routes for further studies at both undergraduate and post graduate level.

2. Programmes Offered in the Faculty/Department

The current focus areas are as follows:

Electrical and Electronics Engineering, Electronics Engineering Technology, Mechanical Engineering, Mechatronics Engineering, Product Development and Manufacturing Technology.

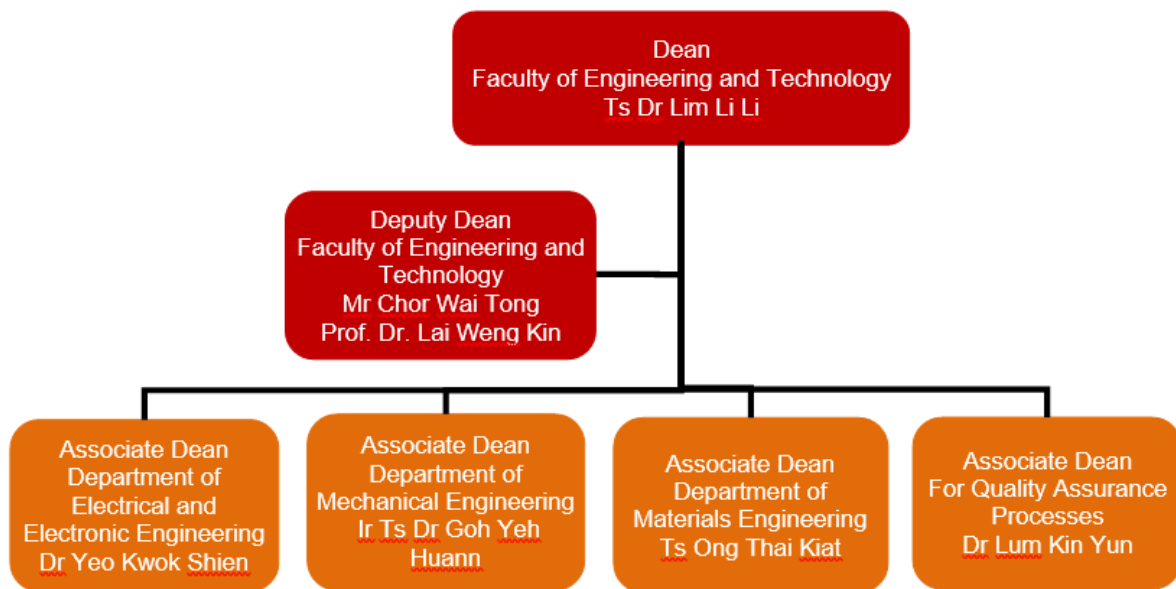
In the Department of Manufacturing Technology, we offer the following programmes:

Diploma in Manufacturing Technology
Diploma in Product Development Technology
Bachelor of Manufacturing and Industrial Technology
Bachelor of Materials and Manufacturing Technology
Master of Engineering Science
Doctor of Philosophy in Engineering

NB: A full list of programmes offered at FOET can be referred to at:

URL: <http://www.tarc.edu.my/foet/index.jsp>

3. Organisation Chart



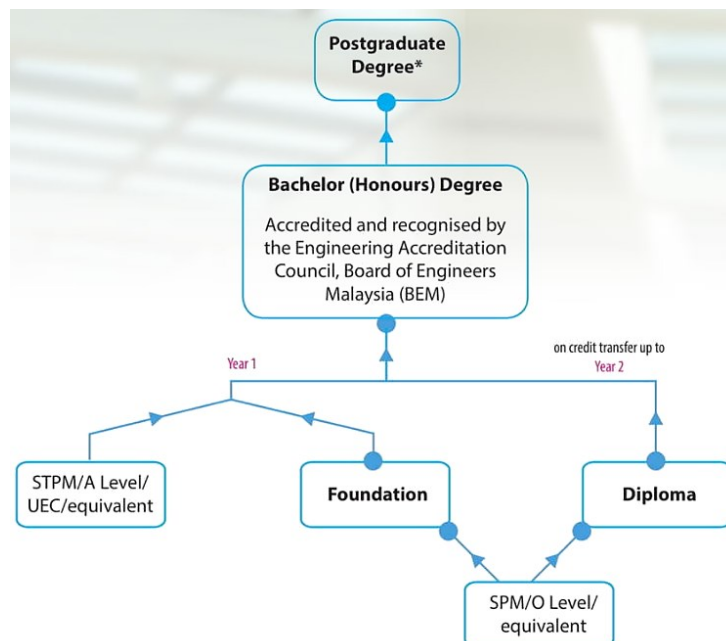
4. Staff Listing

Students can view the information of the staff listing and the academic team from the Faculty website. The teaching team and the office venue are stated in the students' time table for student information.

NB: A full list of staff list for the Department of Materials Engineering at FOET can be referred to at:

URL: <http://www.tarc.edu.my/staffDirectory.jsp>

5. Progression Route



* The Faculty of Engineering and Technology offers the following postgraduate programme:

• Master of Engineering Science KPT/JPS(N/520/7/011)04/25

6. Minimum Entry Requirements

Bachelor of Manufacturing and Industrial Technology with Honours Year 1 Intake: June & Nov:KL Year 2 Intake: Nov:KL	STPM	A Level	UEC	Other IHL	TAR UMT/TAR UC
	Grade C in Physics and one Mathematics subject	Grade D in Physics and one Mathematics subject	5 Grade B in the relevant subjects which must include Physics and one Mathematics subject	Relevant Foundation/ Diploma accredited by MQA	<ul style="list-style-type: none"> Foundation in Science (Track A) OR <ul style="list-style-type: none"> Relevant Diploma
<p style="text-align: center;">AND</p> <p style="text-align: center;">SPM Pass/O Level Grade E (Pass)/UEC Grade C in English Language</p>					

Note:

- Students without a credit in SPM Bahasa Melayu are required to pass Bahasa Kebangsaan A before the award of Bachelor Degree.
- TAR UMT/TAR UC Diploma will be accepted on credit transfer into Bachelor Degree programmes.
- Equivalent qualifications/qualifications from other Institution of Higher Learning (IHL) will be considered on a case-by-case basis.
- Subject to the Ministry of Higher Education latest requirements.

7. Intra and Inter Faculty Transfer

A new student may apply for programme transfer at the beginning of the programme within the stipulated deadline. Applications for intra-faculty transfers (i.e. programme transfer within the faculty should be submitted to the FOET Office (Block M) whereas applications for inter-faculty transfers (i.e. programme transfers to other faculties) should be submitted to the Department of Admissions & Credit Evaluation (Ground Floor, Bangunan Tun Tan Siew Sin) within a stipulated deadline. The closing date for programme/campus transfer is normally on the second Friday after commencement of lectures. Approval for the programme / campus transfer is not guaranteed. Students whose transfers are successful are required to collect their transfer offer letter from FOET Office (for Intra-Faculty Transfer or Department of Admissions & Credit Evaluation (for Inter-Faculty Transfer / Campus Transfer). Students who have accepted the programme / campus transfer will **NOT** be allowed to transfer back into their original programme / campus of study after accepting the transfer through the payment of fees.

8. Lecture and Tutorial Plan

Your respective course lecturers will provide you with a copy of the course plan for lectures and tutorials in week 1 of each semester.

9. Academic Calendar

Academic calendar in each academic year of the intakes for bachelor degree, diploma etc are available at URL: <http://www.tarc.edu.my/admissions/academic-calendar.html> which includes dates for new students reporting, study weeks, examinations weeks and holidays for all semesters of the Academic Year.

10. General Information

10.1 Important Information on Notice Board and Intranet

Students must read the important announcements and information on the notice board placed outside the FOET, Student Intranet, and TAR UMT website. Such announcements and information may include notices on time-table, deadline for online repeat registration, printing of bills & payment, loan application, deadline of printing and payment of tuition fees, interview session for unsatisfactory attendance, etc. The onus is on the students to read these important announcements and information regularly.

10.2 E-Learning System & University E-Mail

Important announcements and information will be channeled to you through the University Student Intranet and University email. You are advised to log-in to your intranet and University email daily to not miss out on any important announcements, information and deadlines. For your University email, a letter will be given to you stating your login ID and password. You are advised to retain this letter for your future reference.

10.3 Change of Address or Contact Number

It is the responsibility of the students to notify the office of the Faculty of any changes in their personal particulars, such as addresses or contact numbers so as to ensure their particulars in the Faculty database are accurate and up-to-date at all times. The Faculty will not be responsible or accountable for delayed, lost mail, or wrong information printed on official documents due to incorrect / obsolete students' addresses and contacts in the Faculty database. Application form for change of addresses or contact number can be obtained from the Faculty office. The completed form, duly filled in and signed, shall be submitted to the office of the Faculty whenever the changes occur.

10.4 Student Time Table

The student time table will be displayed on the notice board outside the office of the Faculty and the Student Intranet, before the commencement of each semester. Students may download their time table from the Student Intranet at TAR UMT website. In order to help students get the most out of their education, subject to availability of resources, classes shall be arranged from 8am to 9pm from Monday to Saturday, except for Public Holidays. Attendance in all classes is mandatory. Exceptions may be made for extenuating circumstances, with applications submitted and prior approval obtained from the faculty.

10.5 Tutorial Groups

Each student will be assigned to a tutorial group. Exchange of tutorial groups will not be permitted except under exceptional circumstances for which prior approval in writing must be obtained from the Associate Dean of the Department. Closing date for submission of Application for Changing of Tutorial Group is normally at the end of second week after the commencement of each semester. Late application will not be entertained.

10.6 Consultation Hours

Each lecturer's consultation hours will be displayed outside their office and FOET noticeboard. Students may see the lecturers during the consultation hours if they have problems in their studies. In order to facilitate effective learning, students are advised to take the active learning approach and read up on the topic(s) concerned and have peer discussions prior to consulting the lecturer.

10.7 Attendance (Lectures, Tutorials and Practical)

Students MUST register their attendance via TARCAApp using TAR UMT WiFi. Students are reminded that attendance is compulsory for all the scheduled classes. Please DO NOT take attendance on behalf of other students nor share the mobile pin code with other students if they are not present for the classes. This action will be deemed as academic misconduct. All students are expected to behave in a manner to uphold the principles of academic integrity. Any students found liable of academic misconduct shall be subjected to disciplinary actions.

Refer to the Academic Regulations for Bachelor & Diploma Programmes 2023 in Student Intranet for more information.

10.8 Application for Leave of Absence

Application for leave of absence may be performed through the Student intranet. The application due to medical or compassionate reasons, must be duly filled in, attached together with relevant supporting documents and submitted through the Student intranet within three (3) days from the date he/she resume his/her study. For other reasons, the application must be submitted with a written explanation and/or supporting documents at least one (1) week before the intended date of absence. The total leave of absence shall not be more than fourteen (14) days within one (1) academic year. The Faculty's decision to approve or reject any application shall be final.

10.9 Reinstatement, Deferment, Withdrawal of Studies

Reinstatement of Study

You may apply for reinstatement of studies if your name has been removed from the University register for the following reasons:

(a) Arrears of tuition fees; or

(b) Arrears of University development fees and insurance (payable by repeat students during the commencement of every academic year)

The application form can be downloaded obtained from the TAR UMT website: > Apply and Study > Registered Student > General Information > Reinstatement of Study, or from the Student Intranet under Information Gateway: - Department of Admission & Credit Evaluation (DACE), or obtainable from the respective Faculty/ DACE. You are required to attach a letter of explanation signed by you together with the completed application form and supporting documents. For students who wish to withdraw in the

current semester, the application form and letter of explanation must be submitted to the FOET office latest by the end of the 8th week (in a long semester) or the end of the 4th week (in a short semester).

For students who have withdrawn in the previous semester, the application form and letter of explanation must be submitted to the Admissions office not less than 1 month before the semester starts.

Your application is subject to the approval of the University. You are required to see your Programme Leader prior to submission of application for reinstatement.

Deferment of Studies

If you wish to defer your studies due to extenuating circumstances, you may apply for deferment of study. The application form can be downloaded from the TAR UMT website: > Apply and Study > Registered Student > General Information > Deferment of Study, or from the Student Intranet under Information Gateway: – Department of Admissions & Credit Evaluation (DACE), or obtainable from the respective Faculty/DACE. The form together with letter of explanation and supporting documents must be submitted to the Admissions office by the 6th week (in a long semester) or 3rd week (in a short semester).

You can only defer for one academic year during the duration of study. Extension for deferment may be considered for one additional year only under exceptional extenuating circumstances. You are required to re-submit your application form together with relevant supporting documents for extension.

The application is subject to the approval of the University. You are required to see your Programme Leader prior to submitting your application for deferment.

Withdrawal of Study

Students who wish to withdraw from their programmes may notify the Department of Admissions & Credit Evaluation (DACE) in writing OR complete a prescribed 'Notification of Withdrawal' form obtainable from the Department of Admissions & Credit Evaluation. The Withdrawal Form can also be downloaded from the TAR UMT website: > Apply and Study > Registered Student > General Information > Withdrawal from Programme or from the Student Intranet under Information Gateway: – Department of Admissions & Credit Evaluation (DACE). The duly completed form is to be submitted to the Department together with the Student ID card.

Students who did not attend classes or discontinued class attendance in a new semester without notifying the University of their withdrawal shall be liable to all fees due to the University for that semester and subsequently shall be withdrawn from the university due to the arrears of fees.

The date of receipt of a student's withdrawal notification will be the official date of withdrawal even if the student has stopped attending classes earlier.

Ex-TARCians who had withdrawn from their Bachelor Degree/Diploma programme and have enrolled into another programme of the same level may be eligible for horizontal credit transfer. The application for horizontal credit transfer is to be made at the respective Faculty latest by Friday of week 4 (for long semester) or week 3 (for short semester) after the commencement of the semester first joined.

The application and more information is available at <https://www.tarc.edu.my/files/admissions/form/AE48885A-7057-47AA-9A92-88142B8C6E44.pdf>

NB: Students are required to constantly refer to Intranet under Department of Admission and Credit Evaluation (DACE) for updated notices and information.

10.10 Student Dialogue

The Faculty will conduct the Student Dialogue sessions with student representatives on programme matters twice in a 14 lecture-week semester of each academic year and once in a 7 lecture-week semester.

10.11 Online Course Evaluation Survey

Towards the end of each semester, all students are required to complete the online course evaluation survey for all courses conducted. Online course evaluation survey is open in weeks 10 to 11 of the 14 lecture-week semesters and weeks 4 to 5 of the 7 lecture-week semesters.

10.12 Online Tracer Study

It is compulsory for all graduates to fill up the online tracer study as required by the Ministry of Education. For more information, please refer to Student Intranet at TAR UMT website.

10.13 Rules and Conduct in Laboratories

Rules and conduct includes operational rules and safety rules in laboratories are clearly displayed in each and every laboratory, users are strictly required to observe and adhere to the rules and regulations to ensure the smooth operation of the laboratories and safe condition are constantly maintained in the laboratories.

10.14 Office Matter

Students are required to refer to student intranet, notice board and office for any office matters and information from time to time so that you are updated with the latest information.

10.15 Students Attire

Students shall dress appropriately and conform to the following guidelines:

Within campus except games and co-curricular activities:

- i. Collared shirts/T-shirt with sleeves and pants/jeans/skirt. No tattered attire is allowed, especially jeans.
- ii. Shirts (except Hawaiian-style shirt) should be tucked in.
- iii. Shorts are not allowed.
- iv. Female students should dress appropriately and modestly. Miniskirts / dresses, high slits or low necklines, "bare back" apparel and exposed midriff and spaghetti-straps or see-through blouses are not allowed.
- v. Proper footwear, shoes/sandals shall be worn. Japanese slippers are not allowed.

Laboratory Attire

- i. Clothing that covers the upper body, arms, and entire leg to the ankle (e.g., pants, skirt, coveralls, lab coat) which fully protects exposed skin.
- ii. Closed-toe shoes that resists rapid penetration by spilled liquids or sharps.
- iii. In laboratories where a fire danger is present, avoid clothing made of synthetic fibres. Wear less flammable natural fibres, such as wool, cotton, jute, flax, and silk.
- iv. Students must be equipped with appropriate personal protective equipment (PPE) relevant to each laboratory. It is the responsibility of the students to observe and abide by the rules and regulations related to laboratory operations.

For games and co-curricular activities:

- i. Proper sports attire (T-shirt, short/track bottom and sports shoes) should be worn at all times.

11. Evaluation and Assessment

11.1 Assessment Components

Students shall be evaluated through the following components:

- a) Final examination; and/or
- b) Coursework which includes test, quiz, practical, project, report & case study; and/or
- c) Any other evaluation approved by TAR UMT.

11.2 Coursework Assessment

11.2.1 Coursework

Coursework comprises of a combination of group and/or individual assignments, oral presentations, short tests, quizzes, laboratory experiment or practical reports, etc.

11.2.2 Coursework Threshold

The pass marks for coursework is 50%. All students must pass the coursework, failing which the students are required to repeat the course concerned. Late submission for coursework will be penalty according to the guidelines for submission of coursework.

11.2.3 Coursework Plagiarism

The Faculty views the plagiarism or collusion cases very seriously. These include, but not limited to, plagiarism or collusion in any part of their assignments, projects or written work, threaten the values of academic work and undermine the credibility and integrity of TAR UMT's awards. Plagiarism or collusion will be dealt with appropriately by the Faculty. Such offenders shall appear before a panel of enquiry at the Faculty and appropriate punishment will be meted out.

Punishment may include failing the students' assignment or project, re-submission of another piece of work or downgrading of the work to the maximum of a pass grade.

11.2.4 What Constitutes "Plagiarism" and "Collusion"?

Plagiarism according to the Oxford Advanced Learner's Dictionary of Current English means "take and use somebody else's ideas, words, etc as if they were one's own". Plagiarism can take the form of reproduction without acknowledgement from published or unpublished works of others including materials downloaded from computer files and the Internet. Collusion can be deemed to be a form of plagiarism involving the unauthorised co-operation between two or more people with deceptive intention.

11.2.5 Student Obligation

Students are deemed to have signed a declaration that the work submitted, such as course work assignment, essays and projects, etc. is their own work and that they have not in any way knowingly allow another student to copy it. It will be assumed that all submitted work is that of the students' own work.

11.2.6 Referencing System

Students are expected to familiarise themselves with or make use of method(s) of citing other people's work in accordance with acceptable referencing. The referencing system used in FOET is the IEEE Referencing System.

12. Examinations

12.1 Grading System and Examination Rules

1. For Bachelor, the University grading scheme is as follows:

[Applicable to July 2023 Year 1 Semester 1 New Intake in Academic Year 2023/2024]

GRADE	MARKS RANGE	GRADE POINT	DESCRIPTION
A+	90 - 100	4.0000	High Distinction
A	80 - 89	4.0000	Distinction
A-	75 - 79	3.6700	Distinction
B+	70 - 74	3.3300	Merit
B	65 - 69	3.0000	Merit
B-	60 - 64	2.6700	Merit
C+	55 - 59	2.3300	Pass
C	50 - 54	2.0000	Pass
F	0 - 49	0.0000	Fail

Passing grade is C and above

2. The Grade Point Average (GPA) for an examination sitting shall be determined by dividing the total Quality Points by the total Credits of all the courses (excluding courses which have no contribution to the GPA) attempted in the same sitting. The Quality Point of a course shall be defined as the Grade Point score multiplied by the Credits of the course.

$$\text{Quality Point} = \text{Grade Point} \times \text{Credits of the course}$$

$$GPA = \frac{\text{Total Quality Points for course(s) with CGPA bearing registered in a Semester}}{\text{Total Credits for all course(s) with CGPA bearing in a Semester}}$$

3. The Cumulative Grade Point Average (CGPA) shall be determined by dividing the Cumulative Quality Points earned by the Cumulative Credits attempted (excluding Credits of course(s) which have no contribution to the GPA/CGPA). Credits of a course which has been attempted more than once shall be counted only once for the Cumulative Credits attempted in determining the CGPA.

$$CGPA = \frac{\text{Total Quality Points for course(s) with CGPA bearing for all Semesters}}{\text{Total Credits for all course(s) with CGPA bearing in all Semesters}}$$

4. Grades A+, A, A-, B+, B, B-, C+, C & F shall be included in the calculation of the GPA and CGPA. Courses not included in the calculation of the GPA and CGPA include:

- (a) courses which have been given exemptions
- (b) courses which have been awarded Satisfactory (S), Unsatisfactory (U) or Absent with valid reason (I)
- (c) MPU-3213 Bahasa Kebangsaan A

5. Normally, Candidates shall be evaluated through the following components:

- (a) Final examination; and/or
- (b) Coursework which includes test, quiz, project, report & case study; and/or
- (c) Practical; and/or
- (d) Any other evaluation approved by the Senate.

6. There shall be threshold requirements for all coursework and final examination as the Senate shall decide:

- (a) Academic courses shall be 50/100 marks for final coursework/practical and 40/100 marks for final examination.
- (b) Mata pelajaran Pengajian Umum (MPU) courses with exception of Co-curriculum shall be 50/100 marks for coursework and 20/100 marks for final examination.

7. The maximum number of attempts allowed for a candidate for a course is four (4) attempts. Thereafter, the candidate shall be required to leave the programme of study.

8. (a) A candidate who fails a course shall repeat the course as decided by the Senate and the latest grade obtained from the repeat course shall be taken for computation of the GPA and CGPA. Under special circumstances as decided by the Senate, a candidate in a graduating semester may be allowed to re-sit the failed course(s).

Notwithstanding the above,

- (b) i. a candidate who fails a course in the first attempt, may be permitted to opt for a resit, on the first instance, when the course is next made available. In the event the said candidate then fails upon the resit, the candidate shall thereafter repeat the course. In the event the candidate passes the course upon a resit as envisaged above, the candidate's grade shall be capped at a minimum pass grade (C).
- ii. with effect from May 2016/2017 academic year, a candidate who has failed the course(s) in the first attempt, may opt to resit the failed course(s), if the following criteria is fulfilled:
 - (1) a minimum CGPA of 1.5000; AND
 - (2) obtained a minimum of 30 final mark for the failed course(s) concerned; AND
 - (3) fulfilled threshold requirements for coursework/practical of the failed course(s) concerned.Notwithstanding the above, the Board of Examiners may, at its discretion consider any exceptional circumstances (e.g. course(s) with exceptionally high failure rate), to permit a resit opportunity to candidates.

12.2 Candidate Academic Status

A candidate's academic standing shall be determined at the end of each semester based on his/her GPA and or CGPA value. The Senate upon the recommendation of the Board of Examiners shall decide the status of the candidate. The guidelines on the academic load shall apply to candidates with the following status:

(a) Good Status Unless a student of the Tunku Abdul Rahman University of Management and Technology being a candidate is placed on Probation or Warning or Final Warning status, he/she shall be deemed to be placed on Good status. A candidate on Good status shall register for ALL courses offered in the semester of his/her programme.

(b) Probation Status If a candidate's GPA is less than 2.0000 at the end of a semester, except in a semester where all courses taken do not contribute towards the computation of GPA and CGPA, he/she shall be placed on "probation" status in his/her programme. The academic probation period shall end when the candidate has attained a GPA of 2.0000 and above in the following semester.

(c) Warning Status A candidate on Probation status who fails to obtain a minimum GPA of 2.0000 at the end of the semester, except in a semester where all courses taken do not contribute towards the computation of GPA and CGPA, shall be placed on "Warning" status in his/her programme. The academic warning period shall end when the candidate has attained a GPA of 2.0000 and above at the end of the following semester. By the end of the said academic warning semester, if the candidate's GPA is less than 2.0000 AND CGPA is less than 1.0000, then the candidate shall leave the programme. A candidate on Warning status shall not be allowed to register for industrial training course.

(d) Final Warning Status A candidate on Warning status who, by the end of such warning status semester obtains a GPA of less than 2.0000 AND CGPA of 1.0000 and above shall be placed on Final Warning status. The final warning period shall end when the candidate has attained a GPA of 2.0000 and above in the following semester. By the end of the final warning status semester, if the candidate's GPA is less than 2.0000, then the candidate shall leave the programme.

A candidate on Final Warning status shall not be allowed to register for industrial training course.

12.3. Maximum Duration of Study

The maximum duration of study given to students shall be two times the minimum duration of the registered university Diploma programme based on the academic year of entry of the intake as specified in the programme structure.

However, students who have not fulfilled all the requirements for graduation at the end of their study may, at the discretion of the Board of Examiners, be allowed to resit / repeat all courses with grades below C, subject to the maximum time frame to graduate.

Notwithstanding the above, the President may, subject to the relevant regulations prevailing, grant extensions of the maximum duration. Students are required to submit an appeal for such an extension of the maximum time frame.

(Examination Regulations for the respective Diploma Programmes are available at TAR UMT Student Intranet).

12.4 Award of Bachelor

Students shall fulfill all the requirements specified for the award of the Diploma as stated below:

(a) successfully completed and passed (unless exempted) all compulsory courses including core, cognate and co-curricular courses; AND

(b) achieved a minimum CGPA of 2.0000; AND

(c) fulfilled all the requirements of the University Regulations; AND

(d) paid all the fees due to the university.

Notwithstanding the above, the award of the Diploma shall be decided by the Senate in accordance to the constitution of the university.

12.5 Classification of Awards

[Applicable to July 2023 Year 1 Semester 1 New Intake in Academic Year 2023/2024]

	CGPA
Honours Degree with Distinction	3.6700 – 4.0000
Honours Degree with Merit	2.6700 – 3.6699
Honours Degree	2.0000 – 2.6699

(Examination Regulations for Bachelor's Degree Programmes is available at TAR UMT Student Intranet.)

12.6 Extenuating circumstances which may affect a candidate's examination performance

(a) Candidates with extenuating circumstances, which may affect his/her examination performance or attendance at the examination, shall submit an appeal in writing within 48 hours from the occurrence of the extenuating circumstances to the Registrar. The appeal is subject to the University's Policy on Extenuating Mitigating Circumstances.

(b) The Registrar may, subject to Rule 7, and upon acceptance of such extenuating circumstances, exempt the candidate from Rule 8 (b) and permit a replacement examination of the affected course(s).

12.7 Appeal for Review of Examination Results

Candidates who wish to appeal for review of examination results may submit a formal online application for review of examination/ co-curricular results not later than one (1) week after the official release of results. A non-refundable processing fee per course shall be chargeable. The decision by the Senate shall be final. Candidates shall be able to view their appeal outcome in the Student Intranet.

12.8 Repeat/Resit Application

Students registering for repeat course(s) OR resit course(s) must register online. The deadline for registration of repeat/resit course(s) will be announced to students through the Student Intranet.

12.9 Online Course Registration / Add and Drop Courses

Only 'Active Status' students are given the option to register for add and drop for main / elective course(s) of current semester or outstanding / resit / repeat course(s). The online course registration portal is accessible for students in the first week of each semester via <https://reg.tarc.edu.my/> on Student Intranet. After registration is done in the first week, students shall print the bill and make payment from the second week (Monday) to the fourth week (Monday). Please refer to notices issued by the Department of Examinations and Credit Accumulation on add and drop course(s) criteria, duration of online registration, printing and payment of bill before commencement of each new semester.

12.10 Examination Requirements

(1) No candidate shall be admitted to an examination unless

(a) the candidate has paid all fees due; and

(b) has attended the relevant programme of study to the satisfaction of the Dean of Faculty concerned.

Failing to fulfil (a) and/or (b) above, the candidate shall be barred from sitting the examination.

(2) Candidates who do not meet the attendance requirements due to extenuating circumstances may appeal in writing to the Dean of Faculty/Head of Branch/Head of Centre for Nation Building and Languages no later than seven (7) calendar days from the date of the official notice of barring.

NB: Students are required to constantly refer to Intranet under Examination for Notices (e.g. registration for Resit/Repeat & co-curriculum etc); Information (e.g. examination regulation, awards, student discipline regulation etc) and other examination related matters.

12.11 Cheating in the Examination

Disciplinary action will be taken against any student who is found cheating or being dishonest or disobeying any instruction given by the Invigilator during the Examination. Disciplinary action may include immediate suspension from the whole Examination or remainder of that Examination. In addition, the student may be expelled by the University.

13. Bursary

13.1 Payment of Fees

Fees payable for newly register students must be paid before or on the date stipulated in the Letter of Offer.

Thereafter, fees payable at the beginning of each semester, unless otherwise specified, must be paid within two (2) weeks from the date of the commencement of the semester, failing which the students shall be withdrawn without further notification. For withdrawal due to non-payment of fees, the withdrawal date shall be the commencement date of the semester.

Payment of fees can be made through the following:

- a) Any branches of Public Bank Berhad counters; or
- b) Public Bank internet banking (www.pbepbank.com); or
- c) TAR UMT Bursary Office (payment via Public Bank debit card, Public Bank credit card, bank draft, bank cheque (upon request), cash (upon request), money order or postal order only) in favour of "TAR UMT".

Notwithstanding the above, if a student faces financial problem and is unable to pay the tuition fees on time, they may be allowed to extend the payment of fees or pay by installment provided that the student has submitted a written explanation, a copy of student bill, and supporting documents to the office of the Faculty before the stipulated deadline stated in the Student Bills.

In the instance where the student is a Perbadanan Tabung Pendidikan Tinggi Nasional (PTPTN) loan holder, and that there is a non-payment of tuition fees due to delay in banking of the loan into the student's account. The student must submit a completed Application Form for Extension of Payment to the Faculty office.

Payment after the due date of payment of fee shall be made via Public Bank debit card or in the form of bank draft only. A bank draft is not a receipt of payment made, it is a cash cheque purchased from the bank. The original bank draft should then be submitted to Bursary for payment.

13.2 Online Printing of Semester Tuition Fees

Students will be advised on the fees payable via notices displayed on the Faculty notice boards or TAR UMT website. Students shall print two (2) copies of the Student Bills via Student Intranet one (1) week before commencement of each semester. The onus is on the students to print the Student Bills and pay the fees before or by the stipulated deadline stated in the Student Bills, failing which it is deemed that the students would have withdrawn from TAR UMT. No late printing of bills will be entertained.

13.3 Refund of Fees

All fees paid are strictly non-refundable and non-transferable.

However, there is a Refund of Fees for newly registered students who withdraw if notification of withdrawal in writing is received before the commencement date of the programme. Fifty percent (50%) of the amount of Tuition Fee, Special Administration Fee, Examination Fee, Laboratory/Workshop Fee and Facilities & Resource Fee paid by the student may be refunded. Registration, Orientation and Activity Fees are strictly non-refundable. If notification of withdrawal in writing is received after the commencement date of the programme, there is strictly no refund of all fees paid. This applies to students who pay and register after commencement date of the programme upon withdrawal from the programme.

Caution money (less any liabilities) may only be refunded on application after a student has completed or withdrawn from his/her last programme of study at TAR UMT. The application for the refund shall be made within one (1) year from the date of completion of study or withdrawal from TAR UMT, failing which the said caution money shall be deemed as donation to the Student Loan Fund.

13.4 Fees for Resit Examination and Repeating Courses

Upon online registration for Resit and/or Repeat course(s), students shall print two (2) copies of the bills via Student Intranet. The onus is on the students to print the Resit and/or Repeat bills and pay the fees before or by the stipulated deadline stated in the Resit and/or Repeat bills. As a guide, payment of resit and repeat bills shall be made by week 5 of the 14 lecture-week semesters or by week 3 of 7 the lecture-week semester.

No late Printing of Bills and Payment of Fees will be entertained. The Resit and/or Repeat fees will not be refunded even if the student is absent from the examination.

14. Financial Aid

There are various types of loans available for all students to apply. The loans are meant to assist students who face financial difficulties in completing their studies in TAR UMT.

14.1 Scholarships, Bursary and Grants

- a) TAR UMT Merit Scholarship (No application is required, scholarship will be awarded automatically)
- b) The Star Education Fund Scholarship
- c) Nanyang Tertiary Education Fund Scholarship
- d) Sin Chew Daily Education Fund Scholarship
- e) TAR UMT for State/National Players
- f) Tan Sri Lee Loy Seng Foundation Scholarship
- g) S.P.Setia Foundation Scholarship
- h) Grants and awards by generous individuals
- i) Industry-Based Study Grants

14.2 Student Loans

There are various types of loans available for students to apply. The type of loans available are as follows:

- a) TAR UMT Student Loan Fund (Open for application in weeks 1-3 of May and September yearly)
- b) Perbadanan Tabung Pendidikan Tinggi Nasional (PTPTN) Loan
- c) Penang State Loan
- d) Perak State Loan
- e) Selangor State Loan
- f) Chang Ming Thien Foundation Loan
- g) KOJADI Study Loan
- h) Carlsberg Hua Zong Education Fund Loan

Please visit the website of TAR UMT or contact Department of Student Affairs (DSA) for more information about scholarships and financial assistance.

14.3 PTPTN

TAR UMT students may apply for PTPTN loan. Students are advised to read the notices and information about PTPTN announced by DSA regularly

15. Computer Services and Facilities

15.1 Communication and Information Technology (CIT) Centre

CIT Centre is situated in Cyber Centre, a three-storey building with a total built-up area of 100,000 square feet. It is designed to provide an ideal environment for student learning and social educational interaction. Seventeen (17) ICT laboratories and twenty one (21) discussion rooms are fully equipped with Internet connectivity to support training, e-learning, multimedia language learning, and a host of other teaching and learning activities (such as Microsoft and SPSS software). These laboratories, discussion rooms and the spacious atrium are furnished and designed to provide a conducive learning environment for students with different learning styles and preferences. The technology supported teaching environment caters for different teaching approaches and knowledge acquisition. This building houses a fast, reliable and comprehensive network infrastructure and various supporting utilities to enable effective and efficient development, operation, and maintenance of ICT facilities and services provided to all campuses.

The functions and services provided by CIT Centre are:

- a) Internet and Intranet Services
- b) Network, Hardware and Software Services
- c) Multimedia Services
- d) Teaching and Learning Technology Support

15.2 Computer Aided Design (CAD) Centre

Computer Aided Design (CAD) centre provides the necessary technical education base for FOET students to learn Computer Aided Design and Drafting (CADD), Computer Aided Engineering (CAE) as well as Computer Aided Management in line with industry requirements. The CAD Centre at Room D109 consists of over one hundred (100) computers. It serves the following activities:

- a) Design and Drafting (CADD) software such as AutoCAD, Revit AutoCAD
- b) Process and Control Design software such as MATLAB and SIMULINK
- c) Materials processing analysis software such as Moldflow Plastic Insight (MPI) and Anycasting simulation software.
- d) Electronic Circuit Design software such as PROTEL and Proteus VSM.
- e) 3D Mechanical Design & simulation software such as SolidWorks, Autodesk Inventor ©Professional.
- f) Material selection software.

16. Library

The Library aims to provide library resources and services to support the teaching, learning and research needs of TAR UMT.

16.1 Academic Resources

The Library has a total collection of over 220,000 volumes of printed books, over 300 titles of print + online serials and 10,600 units of electronic/audio-visual materials. It also provides access to an extensive range of remotely accessible online resources; local and international databases, electronic journals, e-books and CCH online publications.

Databases subscribed by the Library include ACM Digital Library, Ebrary, EBSCOhost Business Source Complete, Emerald, IOPScience, LawNet, Passport GMID, ProQuest Research Library and ProQuest Science Journals.

16.2 Facilities and Services

The Library caters for individual and collaborative work, with over 2,200 seats. Students have access to outstanding facilities for their academic work and study that include study carrels, individual study rooms, discussion rooms, reading rooms, audio visual room, Internet PCs, Wi-Fi access and many more.

The Library provides a number of services including loan services, reference services, self-service borrowing, user education programmes, interlibrary loan services, photocopying services, etc. Registered faculty, staff and students can search the library holdings, gain direct access to the full-text of electronic database and renew/reserve items at anytime, anywhere via Web OPAC (InfoWeb-Online Catalogue).

16.3 Library Induction Programme

The Library conducts a number of user education programmes, comprising:

- i. Library induction programme
The library induction programme is conducted during new intake time. It aims to introduce new students to the collections, services and facilities offered by the library. The programme comprises a PowerPoint presentation and a library-guided tour.
- ii. Library training sessions
The Library offers training sessions to users to equip them with the skills in information searching using library online catalogue and subscribed online databases, e-journals, e-books, etc.

The training sessions covers the following topics:

- i. Library InfoWeb
- ii. Online Resources Searching Skills

16.4 Opening Hours

The opening hours of the Library are as follows:

Day	Normal Days	Examination Period	Semester Holidays
Mondays - Fridays	8.30am - 9.00pm	8.30am - 9.00pm	8.30am - 7.00pm
Saturdays	9.00am - 2.00pm	8.30am - 5.00pm	9.00am - 2.00pm
Sundays	-	9.00am - 5.00pm	-

17. Student Services

17.1 Accommodation

Information on rooms available is regularly disseminated on notice boards maintained by DSA.

TAR UMT students are able to find accommodation in the nearby housing estates which are within easy reach of TAR UMT campus, such as:

- Taman Bunga Raya
- Taman Sri Rampai
- Taman Melawati
- Taman Danau Kota
- Jalan Genting Kelang
- Wangsa Maju
- Setapak Indah
- Wangsa Melawati
- Taman Desa Setapak
- Setapak Jaya
- Taman Melati

Students shall sign a tenancy-agreement with the landlord. It is important that the terms and conditions of the agreement should be clearly stipulated so as to avoid any misunderstanding. Copies of information sheets, "Guidelines on Tenancy Agreements" and "Sample of Tenancy Agreement" are available at the DSA upon request.

17.2 TAR UMT Campus Hostel Accommodation

TAR UMT campus hostel accommodation is available and situated on a 6-acre land. It consists of 10 blocks of 5-storey building with 1,000 rooms which can accommodate 2,000 students. Hostel availability is based on first-come-first-served basis. Students may apply for the hostel only after receiving TAR UMT Offer Letter and having paid the full fees. Please visit the website of TAR UMT or contact DSA for more information about hostel accommodation.

17.3 Sport and Recreation

The outdoor sports facilities available are:

- a) One sports field comprising one soccer pitch, jogging track and two netball courts
- b) One futsal court
- c) One handball court
- d) One dodgeball court
- e) Two volleyball courts
- f) Three basketball courts

17.4 Sport Complex and Clubhouse

The facilities and their operational hours are as follows:

Facilities	Operational Days	Operational Hours
Sports Complex 1 gymnasium 2 multi-purpose halls 3 rooftop tennis courts 6 table tennis courts 6 badminton courts/2 volleyball courts/1 basketball court	Mondays - Fridays Saturdays & Sundays	9.00am - 9.00pm 9.00am - 7.00pm
Clubhouse 2 gymnasiums 2 squash courts An Olympic-sized swimming pool A learner's swimming pool 1 snooker table	Mondays - Fridays Saturdays Sundays	9.00am - 9.00pm 9.00am - 12.00noon 3.00pm - 7.00pm 3.00pm - 7.00pm

17.5 Canteen Facilities

Reasonably priced meals, snacks and refreshments are available at the canteens. The canteens are located at Block G (Red Bricks Cafeteria), Block L (Yum Yum Cafeteria), Garden Cafe at Cyber Centre, Casuarina Cafe (Block SC, East Campus), Richiamo Coffee (Block SC, East Campus) and The Roots Cafe (Block L). Their operational hours are as follows:

Red Bricks Cafeteria Yum Yum Cafeteria Garden Café Casuarina Cafe	Richiamo Coffee	The Roots Cafe
Mondays - Fridays 8.00am - 5.00pm	Mondays - Fridays 7.30am - 10.00pm	*Open hours will be posted at https://www.facebook.com/TheRootsRestaurant/
Saturdays 8.00am - 3.00pm	Saturdays 7.30am - 10.00pm	

17.6 University Bus Services

TAR UMT maintains a regular bus service which ferries students between the campus and the following nearby residential areas:

- Taman Desa Setapak
- Taman Sri Rampai
- Melati Utama
- Wangsa Maju
- Jalan Genting Kelang
- PV10, PV12, PV13, PV15, PV16

The buses operate daily, as follows:

Day	Normal Days	Semester Holidays
Mondays - Fridays	7.15am - 9.30pm	Will be adjusted accordingly
Saturdays	7.15am - 2.00pm	
Sundays & Public Holidays	-	-

TAR UMT bus service makes it very convenient for students to commute between the campus and nearby housing areas. Besides operating a daily bus service along the defined routes, TAR UMT also provides bus services for field trips, educational visits and tours organised by the students.

17.7 Students' Insurance Scheme

A 'Student Personal Accident Insurance Scheme' insures all students of TAR UMT. The policy will cover the students for accidents round the clock, anywhere in the world. The sum insured is RM60,000 for death or total disablement. In the event of death of the policy holder, funeral expenses not exceeding RM5,000 would also be paid.

In addition, students can also claim for medical treatment up to a maximum of RM5,000 and/or RM500 for traditional treatment per year (registered medical practitioners only) for injuries sustained in an accident. Copies of the Insurance Policy's terms and conditions are available at the DSA for reference.

17.8 Student Counseling Services

A team of counselors is available to help students with emotional, personal or academic concerns through individual counseling sessions, group counseling sessions, workshops and seminars. The counselling services are strictly confidential. All individual and group counselling services are free of charge. Counselling services are available to students during office hours at the DSA.

17.9 Student Development and Career Services

Student Development and Career Services (SDCS) offers uniquely designed life programmes that are central to a student's personal and career growth. Some of SDCS specially crafted programmes are:

- a) "Your Leadership DNA" gives students the tools necessary to attain true leadership quality.
- b) "The Road to Excellence" has been designed to enhance students' resiliency and learning agility.
- c) ENACTUS TAR-UC provides students a very unique platform to develop themselves by helping the communities that are in need.
- d) Career Development Workshops & Talks throughout the semester to help students to be aware of present day industries' requirements. The career development workshops are conducted by counsellors, recruitment firms and professional organizations who would guide students in the identification of skills, interests, values and how to make appropriate career decisions with confidence and maximise their employability opportunities.

Some of the Career Talks or Workshops are:

- Company Talks
- Creating Your Future Workshop
- Personality, Goal Setting & Career Profiling Workshops
- Resume Writing & Interviewing Skills Workshops
- Leadership Camp
- Career Decision Making
- Career Fairs

17.10 Clubs, Societies and Committees

It is compulsory for students to join and participate in student academic society of the programme of study.

Advisors and Assistant Advisors will be appointed to guide and advise the students in the societies' activities.

Notwithstanding the above, students are strongly encouraged to join and participate in other clubs and committees for their personal development. Please refer to TAR UMT website (www.tarc.edu.my) for a complete list of clubs, societies and committees.

17.11 Study Abroad Unit (SAU)

The University has entered into various progression and articulation arrangements with universities overseas for both undergraduate and postgraduate studies. SAU provides you with useful information and the academic counselling to ensure you get the best out of your plans to study abroad. For further enquiries, students may visit the Study Abroad Unit (SAU) located at the Centre for Continuing and Professional Education (CPE Centre).

18. Personal Data Protection Act (PDPA) Statement

Please note that your Faculty, lecturer or tutor may transmit your personal data to your parents, guardians, potential employers and / or trainers for the purposes of industrial training or otherwise your programme's learning outcome requirement during the course of this programme for any one or more of the following purposes:

- a) In matters relating to your studies of this course and / or
- b) In matters relating to your academic and disciplinary matter of this programme.

19. Miscellaneous

Students must note that upon registering as students of TAR UMT through payment of fees, they are to abide and comply with all the student code of conduct, rules and regulations of TAR UMT. These include payment of fees, attendance of classes, examinations, and comply with all rules. It is the responsibility of students to familiarise themselves with this code of conduct, rules and regulations. Any breach of the same may lead to disciplinary action.

Part B. Programme specific information

Bachelor of Manufacturing and Industrial Technology

Bachelor of Manufacturing and Industrial Technology with Honours focuses on providing comprehensive understanding of industrial and manufacturing processes, technologies, and practices. This specialized program combines theoretical knowledge with practical skills to prepare students for careers in the field of industrial and manufacturing technology. The students are required to undertake one year work based learning (WBL) courses in collaboration with our industrial partners. This provides students with opportunities to apply classroom knowledge in real-world work environments, gaining valuable hands-on experience and skills relevant to their field of study.

1. Programme Aims

Manufacturing and Industrial Technology focuses on designing, implementing, and optimizing manufacturing processes and industrial systems. It involves automation, materials science, quality control, production management, and sustainable practices to enhance efficiency, productivity, and product quality in manufacturing operations. It integrates engineering principles with business strategies to improve industrial outcomes. Graduates trained under manufacturing and industrial technology program are expected to be innovative, creative, and analytical with excellent work based learning experience (WBL) using CAD/CAM software and other modern technology tools.

Career Prospects:

Bachelor of Manufacturing and Industrial Technology graduates are industrial, manufacturing, and production professionals. Graduates can build their career as a technologist in the field of research and development, automation and system integration, quality assurance maintenance specialist and sale and service. They are well prepared as a technopreneur to fulfil the country's needs of the Fourth Industrial Revolution (IR 4.0).

2. Programme Educational Objectives (PEO)

The programme objectives describe the expected achievements of the Manufacturing and Industrial Technology graduates in their career and professional life a few years after their graduation.

The programme objectives are as follow:

1. Graduates are competent in the practice of manufacturing and industrial technology.
2. Graduates are engaged in lifelong learning, management activities and professional development.
3. Graduates are committed to professionalism in manufacturing and industrial technology practices and contribute to the society.

3. Programme Outcomes (PO)

The programme outcomes are statements that describe what students are expected to know and be able to perform or attain by the time of graduation in relation to the skills, knowledge and behaviour that students acquire through the Bachelor of Manufacturing and Industrial Technology programme. All technology programmes in the faculty have adopted the Outcome Based Education (OBE) approach in their teaching and learning methodology in accordance to the MBOT accreditation requirements.

The NINE programmes outcomes derived from the program objectives are:

- PO1 **Knowledge** - Apply knowledge of mathematics, science, manufacturing and industrial technology fundamental to the broadly defined and applied procedures, processes, systems and methodologies.
- PO2 **Practical Skills / Modern Tool Usage / Digital Skills** - Select and apply appropriate resources, techniques and modern tools to solve broadly-defined manufacturing and industrial technology problems.
- PO3 **Analytical and Critical Thinking and Scientific Approach / Numeracy Skills** - Solve broadly-defined problems in manufacturing and industrial technology through deep investigation, analytical, critical thinking and scientific approach.
- PO4 **Communication Skills** - Communicate effectively and flexibly in both oral and written means for social, academic and professional purposes.

- PO5 **Social and Responsibility in Society and Technologist Community** - Illustrate the understanding of the social, cultural, global and environmental responsibilities to the broadly-defined manufacturing and industrial technology practices.
- PO6 **Lifelong learning and information management / Personal Skills** - Recognize the need for professional development and information management in manufacturing and industrial technology, and engage in independent and lifelong learning.
- PO7 **Technopreneurship and Management Skills** - Demonstrate an awareness and understanding of management, business practices and technopreneurship.
- PO8 **Ethics and Professionalism** - Illustrate the understanding of the professional and ethical responsibilities of manufacturing and industrial technologists and the commitment to them.
- PO9 **Teamwork and Leadership** - Function effectively as an individual and in a diverse team with the capacity to be a leader or manager.

4. DISCLAIMER

The information here is correct at the time of publishing. Notwithstanding the above, TAR UMT reserves the right to amend, alter or otherwise change any of the information, facts, regulations and rules contained herein and without prior notice. Students shall refer to the notice boards, Intranet, and TAR UMT website (www.tarc.edu.my) for the latest information.

PROGRAMME STRUCTURE

(202405) Year 1 Semester 1											
Course Code	Course Title	Credit Hrs	CW:EX	L	T	P	O	Type	Pre-req	Credit Bearing	CGPA Bearing
BJEL1513	ENGLISH FOR TERTIARY STUDIES	3	100:0	0	28	0	0	Compulsory	Nil	Y	Y
BGMA1113	TECHNICAL MATHEMATICS	3	40:60	28	21	0	0	Core	Nil	Y	Y
BGMA1143	COMPUTER PROGRAMMING	3	50:50	28	0	42	0	Core	NIL	Y	Y
BGMA1133	MATERIALS SCIENCE AND TECHNOOGY	3	50:50	28	0	28	0	Core	nil	Y	Y
BGMA1123	MEASUREMENT AND WORKSHOP TECHNOLOGY	3	100:0	14	0	42	0	Core	nil	Y	Y
BGMA1313	ELECTRIC CIRCUITS	3	40:60	28	21	9	0	Core	nil	Y	Y
Total:		18									

(202409) Year 1 Semester 2											
Course Code	Course Title	Credit Hrs	CW:EX	L	T	P	O	Type	Pre-req	Credit Bearing	CGPA Bearing
Total:		0									

(202501) Year 1 Semester 3											
Course Code	Course Title	Credit Hrs	CW:EX	L	T	P	O	Type	Pre-req	Credit Bearing	CGPA Bearing
BJEL1523	ACADEMIC ENGLISH	3	100:0	0	28	0	0	Compulsory	Nil	Y	Y
BGMA1223	APPLIED MATHEMATICS FOR TECHNOLOGIST	3	40:60	28	21	0	0	Compulsory	NIL	Y	Y
BGMA1233	INDUSTRIAL AUTOMATION	3	50:50	28	0	28	0	Core	NIL	Y	Y
BGMA1503	MANUFACTURING TECHNOLOGY	3	50:50	42	0	30	0	Core	NIL	Y	Y
BGMI1213	SOLID MODELLING AND 3D PRINTING	3	100:0	0	0	56	0	Core	NIL	Y	Y
BGMI1242	COMPUTER-AIDED DESIGN AND DRAFTING	2	100:0	0	0	28	0	Core	NIL	Y	Y
Total:		17									

(202505) Year 2 Semester 1											
Course Code	Course Title	Credit Hrs	CW:EX	L	T	P	O	Type	Pre-req	Credit Bearing	CGPA Bearing
MPU-3372	INTEGRITY AND ANTI-CORRUPTION	2	100:0	0	14	0	0	Compulsory	Nil	Y	Y
MPU-3252	ENTREPRENEURSHIP	2	100:0	14	14	0	0	Core	Nil	Y	Y
BGMI2114	CNC TECHNOLOGY AND MACHINING	4	100:0	28	0	42	0	Core	NIL	Y	Y
BGMI2123	STATIC AND DYNAMIC	3	40:60	42	7	0	0	Core	NIL	Y	Y
BGMI2153	STRENGTH OF MATERIALS	3	40:60	42	7	6	0	Core	NIL	Y	Y
BGMI2133	THERMOFLUIDS	3	40:60	42	7	6	0	Core	NIL	Y	Y
MPU-34X2	Co-curriculum	2	100:0	0	0	28	0	Compulsory	NIL	N	N
Total:		19									

(202509)Year 2 Semester 2											
Course Code	Course Title	Credit Hrs	CW:EX	L	T	P	O	Type	Pre-req	Credit Bearing	CGPA Bearing
MPU-31E3	FALSAFAH DAN ISU SEMASA	3	100:0	0	0	0	14	Compulsory	Nil	Y	Y
MPU-31T3	PENGHAYATAN ETIKA DAN PERADABAN	3	100:0	0	0	0	14	Compulsory	Nil	Y	Y
BJEL2913	ENGLISH FOR CAREER PREPARATION	3	100:0	0	0	0	28	Compulsory	Nil	Y	Y
Total:		9									

(202601) Year 2 Semester 3											
Course Code	Course Title	Credit Hrs	CW:EX	L	T	P	O	Type	Pre-req	Credit Bearing	CGPA Bearing
BGMI2302	PROJECT AND DISSERTATION I	2	100:0	3	0	0	0	Core	NIL	Y	Y
BGMA2343	TOTAL PRODUCTIVE MAINTENANCE	3	50:50	28	14	0	0	Core	Nil	Y	Y
BGMI2363	DESIGN OF AUTOMATION SYSTEMS	3	40:60	42	7	10	0	Core	BGMA1233	Y	Y
BGMI2323	FINITE ELEMENT ANALYSIS	3	100:0	21	7	28	0	Core	BGMI2153 STREI	Y	N

Course Code	Course Title	Credit Hrs	CW:EX	L	T	P	O	Type	Pre-req	Credit Bearing	CGPA Bearing
BGMA2333	MANAGEMENT AND FINANCE FOR TECHNOLOGIST	3	40:60	42	0	0	0	Core	Nil	Y	Y
BGMA2312	TECHNOLOGIST AND SOCIETY	2	100:0	14	14	0	0	Core	Nil	Y	Y
Total:		16									

(202601) Year 3 Semester 1											
Course Code	Course Title	Credit Hrs	CW:EX	L	T	P	O	Type	Pre-req	Credit Bearing	CGPA Bearing
BGMI2304	PROJECT AND DISSERTATION II	4	100:0	0	0	0	0	Core	NIL	Y	Y
BGMI3523	ADVANCES IN INDUSTRIAL REVOLUTION 4.0	3	40:60	42	0	14	0	Core	N/A	Y	N
BGMI3114	INDUSTRIAL ROBOTIC SYSTEMS	4	40:60	42	7	28	0	Core	NIL	Y	Y
BGMA2033	QUALITY ENGINEERING	3	50:60	42	0	14	0	Core	NIL	Y	Y
BGMA3433	MANUFACTURING AND OPERATIONS MANAGEMENT	3	40:60	42	7	0	0	Core	NONE	Y	Y
Total:		17									

(202609) Year 3 Semester 2											
Course Code	Course Title	Credit Hrs	CW:EX	L	T	P	O	Type	Pre-req	Credit Bearing	CGPA Bearing
BGMA4104	MANUFACTURING PROCESSES, SYSTEM UNDERSTANDING /	4	100:0	43	0	0	100	Core	Nil	Y	Y
BGMA4114	PRINTING PROCESSES, CONTROL AND AUTOMATION	4	100:0	44	0	0	100	Core	Nil	Y	Y
BGMA4124	TIN CAN PROCESSES, CONTROL AND AUTOMATION	4	100:0	44	0	0	100	Core	Nil	Y	Y
Total:		12									

(202701) Year 3 Semester 3											
Course Code	Course Title	Credit Hrs	CW:EX	L	T	P	O	Type	Pre-req	Credit Bearing	CGPA Bearing
BGMI491C	INDUSTRIAL TRAINING	12	100:0	0	0	0	936	Core	nil	Y	Y
Total:		12									

Total credit hours:120

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Course List

<u>Course Number</u>	<u>Course Code and Title</u>
1	BJEL1513 ENGLISH FOR TERTIARY STUDIES
2	BGMA1113 TECHNICAL MATHEMATICS
3	BGMA1143 COMPUTER PROGRAMMING
4	BGMA1133 MATERIALS SCIENCE AND TECHNOLOGY
5	BGMA1123 MEASUREMENT AND WORKSHOP TECHNOLOGY
6	BGMA1313 ELECTRIC CIRCUITS
7	BJEL1523 ACADEMIC ENGLISH
8	BGMA1223 APPLIED MATHEMATICS FOR TECHNOLOGIST
9	BGMA1233 INDUSTRIAL AUTOMATION
10	BGMA1503 MANUFACTURING TECHNOLOGY
11	BGMI1213 SOLID MODELLING AND 3D PRINTING
12	BGMI1242 COMPUTER-AIDED DESIGN AND DRAFTING
13	MPU-3372 INTEGRITY AND ANTI-CORRUPTION
14	MPU-3252 ENTREPRENEURSHIP
15	BGMI2114 CNC TECHNOLOGY AND MACHINING
16	BGMI2123 STATIC AND DYNAMIC
17	BGMI2153 STRENGTH OF MATERIALS
18	BGMI2133 THERMOFLUIDS
19	MPU-31E3 FALSAFAH DAN ISU SEMASA
20	MPU-31T3 PENGHAYATAN ETIKA DAN PERADABAN
21	BJEL2913 ENGLISH FOR CAREER PREPARATION
22	BGMI2302 PROJECT AND DISSERTATION I
23	BGMA2343 TOTAL PRODUCTIVE MAINTENANCE
24	BGMI2363 DESIGN OF AUTOMATION SYSTEMS
25	BGMI2323 FINITE ELEMENT ANALYSIS
26	BGMA2333 MANAGEMENT AND FINANCE FOR TECHNOLOGIST
27	BGMA2312 TECHNOLOGIST AND SOCIETY
28	BGMI2304 PROJECT AND DISSERTATION II
29	BGMI3523 ADVANCES IN INDUSTRIAL REVOLUTION 4.0
30	BGMI3114 INDUSTRIAL ROBOTIC SYSTEMS
31	BGMA2033 QUALITY ENGINEERING
32	BGMA3433 MANUFACTURING AND OPERATIONS MANAGEMENT
33	BGMA4104 MANUFACTURING PROCESSES, SYSTEM UNDERSTANDING AND M
34	BGMA4114 PRINTING PROCESSES, CONTROL AND AUTOMATION
35	BGMA4124 TIN CAN PROCESSES, CONTROL AND AUTOMATION
36	BGMI491C INDUSTRIAL TRAINING

1.	Name of Course :	ENGLISH FOR TERTIARY STUDIES													
	Course Code :	BJEL1513													
2.	Synopsis :	This course will expose students to the fundamentals of listening and reading skills, as well as basic foundation in grammar and vocabulary to enhance their language proficiency and enable them to cope with their studies in English at tertiary level. (CEFR Mid B2)													
3	Credit Value :	3													
4	Prerequisite/co-requisite: (if any)	Nil													
5	Course Learning Outcomes (CLO) :														
	CLO1	Present themes, messages or main points based on selected videos. (A2, PLO9)													
	CLO2	Explain the use of grammar components in various texts. (A3, PLO9)													
	CLO3	Present personal views based on the content of selected articles. (A2, PLO9)													
6	Course Learning Outcomes (CLO)	Programme Learning Outcomes (PLO)													
		PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12		
	CLO 1									✓					
	CLO 2									✓					
	CLO 3									✓					
7	Course Content Outline														
Grammar: - Revisit Subject Verb Agreement (SVA) - Modal Verbs - Phrasal Verbs - Collocations - Tenses: - Simple Present - Present Continuous - Simple Past - Past Continuous - Present Perfect - Past Perfect - Present Perfect Continuous - Past Perfect Continuous - Simple Future - Future Continuous - Future Perfect - Future Perfect Continuous															
Listening and Speaking Skills: - Orientating yourself to the text - Predicting the situation - Listening to understand context - Listening for specific information - Predicting types of words needed - Identifying main ideas - Identifying details - Understanding stress and intonation - Identifying speaker's views, attitudes, and opinions - Identifying facts and opinions - Making inferences and drawing conclusions - Following signpost words - Speaking with correct pronunciation - Stress and intonation - Fluency in speaking															

<p>Reading and Vocabulary Skills:</p> <ul style="list-style-type: none"> - Skimming and scanning for main idea(s) - Identifying details and examples to support an argument - Making inferences and predictions based on information in the text - Identifying the purpose of a paragraph or text - Distinguishing fact from opinion - Interpreting text for author's intention, attitudes and style - Inferring meaning from unfamiliar words - Analysing prefixes and suffixes - Deducing meaning from context - Connotative meaning of words - Denotative meaning of words - Lexical meaning of words - Semantic mapping of synonyms, antonyms and root words - Recognising words related to a certain context (Vocabulary List) 		
<p>Writing Skills</p> <ul style="list-style-type: none"> - Spelling and punctuations 		
8	<p>References (include required and further readings, and should be the most current)</p>	<ol style="list-style-type: none"> 1. McWhorter, K. and Sember, B., 2020. College reading and study skills. 14th ed. New York: Pearson. 2. Gaudart, H. et.al. 2019. Towards Better English Grammar Third Edition. Selangor: Oxford Fajar Sdn. Bhd. 3. Hughes, J., Stephenson, H.& Dummett, P., 2019, Life Intermediate Student's Book, 2nd Edition, National Geographic Learning, Hampshire. 4. Goldstein, B., Jones, C., Eckstut, S., Ball, R., Flores, C.C., Schwartzberg, N., 2019, Evolve Level 4 Full Contact. Cambridge University Press.

1.	Name of Course :	TECHNICAL MATHEMATICS													
	Course Code :	BGMA1113													
2.	Synopsis :	The study of mathematics is vital to solving the problem in manufacturing and industrial technology. This course enhances conceptual understanding in Algebra, Trigonometry, modelling and Complex number. Upon completion, the students would have acquired firm mathematical knowledge to the mathematic application in industry.													
3	Credit Value :	3													
4	Prerequisite/co-requisite: (if any)	Nil													
5	Course Learning Outcomes (CLO) :														
	CLO1	Solve problems involving algebra and trigonometry (C3, PLO1)													
	CLO2	Apply linear, quadratic and power law functions in modelling (C3, PLO1)													
	CLO3	Analze problems involving complex numbers.(C3, PLO1)													
6	Course Learning Outcomes (CLO)	Programme Learning Outcomes (PLO)													
		PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12		
	CLO 1	✓													
	CLO 2	✓													
	CLO 3	✓													
7	Course Content Outline														
	Algebra:		Notation, Symbols, Indices,Simplification, Factorisation,Algebraic Fractions,Transposition,applications of Algebra in technology.												
	Trigonometry:		Right-angled triangles, trigonometric functions,identities,applications of trigonometry to triangles and waves.												
	Functions and modelling:		linearm quadratic, oscillating, inverse square law. Application of function and modelling in Technology.												
	Complex Number:		Complex arithmetic, Argand Diagram,polar form,exponential form,De Moivre, application of complex number in Technology.												
8	References (include required and further readings, and should be the most current)		Main references supporting the course 1. Glyn James (2015) Modern Engineering Mathematics, 5th Edition, Prentice Hall. 2. A. J. Washington (2018) Basic Technical Mathematics with Calculus, 11th edition, Pearson. Additional references supporting the course 3. John Bird (2014) Engineering Mathematics, 7th edition, Routledge. 4. John Bird (2014) Higher Engineering Mathematics, 7th edition, Routledge. 5. K.A. Stroud and Dexter J. Booth (2013) Engineering Mathematics, 7th edition, Palgrave Macmillan.												

1.	Name of Course :	COMPUTER PROGRAMMING													
	Course Code :	BGMA1143													
2.	Synopsis :	This course introduces students to a structured approach to programming to explore applications developed using programming language in engineering and technology.													
3	Credit Value :	3													
4	Prerequisite/co-requisite: (if any)	NIL													
5	Course Learning Outcomes (CLO) :														
	CLO1	Apply the programmable algorithms using control structures. (C3, PLO1)													
	CLO2	Apply functions, arrays, pointers, file I/O and simple algorithms in computer programs. (C3, PLO1)													
	CLO3	Construct the devised solutions to simple computing problems into computer programs using integrated development environment (IDE). (P4, PLO2)													
6	Course Learning Outcomes (CLO)	Programme Learning Outcomes (PLO)													
		PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12		
	CLO 1	✓													
	CLO 2	✓													
	CLO 3		✓												
7	Course Content Outline														
<p>"Introduction:</p> <ul style="list-style-type: none">-Brief history of computing and introduction to programming language. <p>Familiarization with IDE:</p> <ul style="list-style-type: none">-Introduction to the programs development processes <p>Data types and variables</p> <ul style="list-style-type: none">- Study of data types and variables, variable declarations, operators and expressions. <p>Operators and expression:</p> <ul style="list-style-type: none">- Arithmetic, relational, logical, assignment and other operators.-Study of the various expressions used in conjunction with the operators. <p>Tools used to document program logic:</p> <ul style="list-style-type: none">- Flowchart- Pseudo code <p>"Control Structure (Selection):</p> <ul style="list-style-type: none">-Control structure statements and blocks such as IF statements, ELSE statements, MULTIPLE IF statements, SWITCH statements. <p>Control Structure (Repetition):</p> <ul style="list-style-type: none">- Control structure statements and blocks such as FOR loop, NESTED FOR loop.- Control structure statements and blocks such as WHILE loop, DO WHILE loop." <p>"Functions:</p> <ul style="list-style-type: none">-Functions and program structure.- The syntax and concepts of using functions, parameter passing, external variables and the scope of the variables.- Make function call by value and by reference.- Use of standard header files and user defined header files." <p>"Pointers and Arrays:</p> <ul style="list-style-type: none">-Study of one dimensional arrays and multi-dimensional arrays.- Passing array to function- Study of pointers and arrays.- Pointers and addresses.-Pointer arrays & Pointers to functions. <p>"Advance Input and output:</p>															

8	References (include required and further readings, and should be the most current)	<p>"Main references supporting the course</p> <ol style="list-style-type: none"> 1. Slobodan Dmitrovic, (2020), Modern C++ for Absolute Beginners, Apress 2. D. S. Malik, (2018), C++ Programming: Program Design Including Data Structures, 8th Edition, Cengage Learning <p>Additional references supporting the course</p> <ol style="list-style-type: none"> 1. P. J. Deitel, H. M. Deitel, (2017), C++: How to program, 10th Edition, Pearson 2. D. S. Malik, (2018), C++ programming: from problem analysis to program design, 8th Edition, Cengage Learning"
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1.	Name of Course :	MATERIALS SCIENCE AND TECHNOLOGY													
	Course Code :	BGMA1133													
2.	Synopsis :	This course covers the structures, properties, and applications of metal, polymer, ceramics, and composite materials.													
3	Credit Value :	3													
4	Prerequisite/co-requisite: (if any)	Nil													
5	Course Learning Outcomes (CLO) :														
	CLO1	Elucidate the structure and properties of various metallic and non-metallic materials (C2, PLO1)													
	CLO2	Predict the appropriate materials for specific application. (C3, PLO1)													
	CLO3	Follow experimental techniques to investigate material structure and properties. (P3, PLO2)													
6	Course Learning Outcomes (CLO)	Programme Learning Outcomes (PLO)													
		PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12		
	CLO 1	✓													
	CLO 2	✓													
	CLO 3		✓												
7	Course Content Outline														
"Material Classification: Influence of atomic structure and bonding on the structure and properties of materials."															
"Structure: • Crystalline, glassy and amorphous structures, defect structure and strengthening mechanisms. • Phase diagrams: single phase and multiphase, use of phase diagrams to predict structure and properties. • Influence of grain size and phase distribution on properties."															
"Mechanical Properties: Strength, elasticity, plasticity, hardness, toughness, ductility."															
"Electrical Properties: • Conductivity and resistivity, intrinsic and extrinsic semiconductors, the p-n junction."															
"Metals, polymers, ceramics and composites: • Properties and typical applications of each group of materials."															
"Advanced Materials: • Smart materials. • Materials 4.0"															
8	References (include required and further readings, and should be the most current)	"Main references supporting the course: 1. Callister, W.D.,(2021) Fundamentals of materials science and engineering, 6th Edition, Wiley,Hoboken, NJ. 2. Donald, R. Askeland, (2019), Essentials of materials science and engineering, 4th Edition, Cengage Learning. Additional references supporting the course: 1. Smith, W.F., (2019), Foundations of Materials Science and Engineering, 6th Edition, McGraw Hill, New York. 2. Michael Ashby, Hugh Shercliff, and David Cebon. Materials : engineering, science, processing and design (2019), 4th Edition, Oxford : Butterworth-Heinemann, Elsevier."													

1.	Name of Course :	MEASUREMENT AND WORKSHOP TECHNOLOGY													
	Course Code :	BGMA1123													
2.	Synopsis :	This course aims to equip students with foundation for different types of measuring and instruments and gauges used in manufacturing processes. The knowledge and skills for conventional workshop technologies including use of hand tools, milling machine, lathe machine, drilling machine and grinding machine are inclusive.													
3	Credit Value :	3													
4	Prerequisite/co-requisite: (if any)	nil													
5	Course Learning Outcomes (CLO) :														
	CLO1	Perform measurements using various types of measuring instruments used by industries in manufacturing processes. (P4,PLO2)													
	CLO2	Identify the structure and components of various cutting machines used by industry in manufacturing processes. (C3, PLO1)													
	CLO3	Manipulate various types of cutting machines that meet industry requirements. (P3, PLO2)													
	CLO4	Identify quality assurance, testing, commissioning, and commissioning needs. (C3, PLO3)													
6	Course Learning Outcomes (CLO)	Programme Learning Outcomes (PLO)													
		PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12		
	CLO 1		✓												
	CLO 2	✓													
	CLO 3		✓												
	CLO 4			✓											
7	Course Content Outline														
	"Industrial Safety: Mechanical accidents, electrical accidents, safety devices. Safety operating procedures Care and order in the workshop. Safety precautions. Industrial Safety and Healthy Act 1994"														
	"Measurement Tools and Concepts: Accuracy of measuring instruments, calibration and traceability of standard for measuring instruments Dimensional tolerances and layout Working principles and measurement for one dimensional measuring instrument (i.e. micrometres, callipers, dial indicators). Two dimensional measurements: i.e. checking of angles, hole to hole distance, pitch distance, measurement of hole positions. Applications of Digital tools and linear scale. Introduction to Geometric Dimensioning and Tolerancing."														
	"Principles of cutting tools and cutting technology Rake and clearance. Cutting tools, tool life and tool wear, force on tools, chips, fluids and coolant, heat produced during cutting operation."														
	"Drilling machines Drill: types, parts and functions, drill angle and grinding of drill. Drilling process; drilling of an ordinary hole, countersinking; counter boring, sport facing etc. Drilling machines; types, parts and functions Cutting speed and feed. Set up and holding of work piece while drilling. Safety precautions. Maintenance."														
	"Milling machine: Types and functions of main parts. Various milling operations, gang milling, facing, profiling, indexing, and milling cutters. Various adjustments, step and slot, feeds and cutting speeds. Safety precautions. "														

	<p>"Lathe machine: Types, main parts and functions. Operations between centres face plates, chucks. Cutting tools, angles, shapes, and materials. Other operation: Making of a thread, boring, drilling knurling. Cutting speeds and feeds and cutting external threads. Safety precautions."</p>		
	<p>"Grinding machine: Types and uses. Grinding wheel: types and uses, specifications, balancing, dressing, fixing and truing of wheels. Safety precautions."</p>		
	<p>"Quality Assurance, Testing, Commissioning, and Maintenance: Product quality and assurance including ISO and QS standards. Non-destructive and Destructive testing. Concept of Reliability Engineering and relevance to Commissioning and Maintenance. "</p>		
8	<table border="1"> <tr> <td data-bbox="185 533 699 815">References (include required and further readings, and should be the most current)</td><td data-bbox="699 533 1425 815"> <p>"Main references supporting the course 1. Kalpakjian, S., Schmid, S. (2022) Manufacturing Processes for Engineering Materials in SI Units, 6th Edition, Pearson 2. Kalpakjian, S. (2019) Manufacturing. Engineering and Technology, 8th Edition Prentice Hall 3. Raghavendra and Krishnamurthy. (2017), Engineering Metrology and Measurements, Oxford University Press."</p> </td></tr> </table>	References (include required and further readings, and should be the most current)	<p>"Main references supporting the course 1. Kalpakjian, S., Schmid, S. (2022) Manufacturing Processes for Engineering Materials in SI Units, 6th Edition, Pearson 2. Kalpakjian, S. (2019) Manufacturing. Engineering and Technology, 8th Edition Prentice Hall 3. Raghavendra and Krishnamurthy. (2017), Engineering Metrology and Measurements, Oxford University Press."</p>
References (include required and further readings, and should be the most current)	<p>"Main references supporting the course 1. Kalpakjian, S., Schmid, S. (2022) Manufacturing Processes for Engineering Materials in SI Units, 6th Edition, Pearson 2. Kalpakjian, S. (2019) Manufacturing. Engineering and Technology, 8th Edition Prentice Hall 3. Raghavendra and Krishnamurthy. (2017), Engineering Metrology and Measurements, Oxford University Press."</p>		

1.	Name of Course :	ELECTRIC CIRCUITS													
	Course Code :	BGMA1313													
2.	Synopsis :	This course provides students with a broad knowledge of electrical principles and laws. Students will be exposed to dc and ac circuits and will learn to use various electric circuit theorems to solve practical engineering problems. For practical, students are required to carry out experiments and to perform calculations and analysis of electrical circuits and theorem.													
3	Credit Value :	3													
4	Prerequisite/co-requisite: (if any)	nil													
5	Course Learning Outcomes (CLO) :														
	CLO1	Demonstrate understanding of basic electrical principles for resistive circuit measurements. (C3, PLO1)													
	CLO2	Use suitable circuit theorem to solve DC circuit problems. (C3, PLO3)													
	CLO3	Apply basic electrical principles for inductive or capacitive circuit measurements. (C3, PLO3)													
	CLO4	Follow electronic workbench tools in circuit analysis. (P3, PLO2)													
6	Course Learning Outcomes (CLO)	Programme Learning Outcomes (PLO)													
		PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12		
	CLO 1	✓													
	CLO 2			✓											
	CLO 3			✓											
	CLO 4		✓												
7	Course Content Outline														
<p>" Basic Electrical Systems</p> <ul style="list-style-type: none">• Electromotive Force and potential difference• Atomic structures• Charge and Current• Current flow convention• Ideal and practical voltage and current source <p>Ohm's Law:</p> <ul style="list-style-type: none">• Ohm's Law and resistance• The relationship of current voltage and resistance• Insulators and conductors• Electrical safety <p>" DC Series Circuit</p> <ul style="list-style-type: none">• Resistors in series• Current in an electric circuit• Total series resistance,• Ohm's law in series circuit• Voltage sources in series• Kirchhoff's voltage law• Voltage dividers• Power in a series circuit,• Circuit ground"															

" DC Parallel Circuit

- Resistors in parallel
- Voltage in parallel circuits
- Kirchhoff's current law
- Total parallel resistance
- Ohm's law in parallel circuits
- Current sources in parallel
- Current dividers
- Power in parallel circuits"

" Circuit Theorems and Conversions

- The voltage source
- The current source
- Source conversions
- The superposition theorem
- Thevenin's theorem
- Norton's theorem,

" Branch, Mesh and Node Analysis

- Branch current method
- Mesh current method
- Node Voltage Method"

"Basic Instrumentation

- Principles and application of electronic voltage meters
- Moving- coil instrument
- Multi-range voltmeter, ammeter and ohmmeter."

" Introduction to Alternating current and voltage

- Generation of alternating e.m.f.
- Sinusoidal voltage sources
- Voltage and current values of sine waves
- Angular measurement of a sine wave
- The sine wave formula
- Average and effective values
- Form factor
- Ohm's law and Kirchhoff's laws in AC circuits, Superimposed DC and AC voltages, Non-sinusoidal waveforms"

" Electromagnetism and Inductors

- The magnetic field
- Electromagnetism
- Field strength
- Permeability
- Magnetic hysteresis
- Electromagnetic induction
- Induced e.m.f."

"Capacitors

- The basic capacitor
- Types of capacitors
- Series capacitors
- Parallel capacitors
- Capacitors in DC circuits
- Capacitors in AC circuits

Inductors

- The basic inductor
- Types of inductors
- Series inductors
- Parallel inductors
- Inductors in DC circuits
- Inductors in AC circuits"

	<p>" AC Circuits</p> <ul style="list-style-type: none"> • Response of basic R, L, C element to a sinusoidal voltage or current • Inductive and capacitive reactances, impedance, admittance, conductance, susceptance • Leading and lagging of current in R, L, C elements • Frequency response plots of the L and C elements. • Phasor representation of voltage and current in AC circuits. • Voltage and current in parallel RL and RC circuits. • Expressing voltage, current and impedance in complex notation, rectangular form and polar form. • Power in AC circuit"
8	<p>References (include required and further readings, and should be the most current)</p> <p>"1. Thomas L. Floyd, David M. Buchla, Principles of Electric Circuits: Conventional Current Version, 10th edition, Pearson (2020) 2. Charles Alexander and Matthew Sadiku, Fundamentals of Electric Circuits, 7th Edition, Mc Graw Hill (2021) 3. Robert L. Boylestad, Brian A. Olivari, Introductory Circuit Analysis, 14th Edition, Global Edition, Pearson (2023)"</p>

1.	Name of Course :	ACADEMIC ENGLISH													
	Course Code :	BJEL1523													
2.	Synopsis :	This course will expose students to the essential communication skills, as well as a appropriate vocabulary and grammar to enhance their language proficiency and enable them to cope with their studies in English at tertiary level. (CEFR B2)													
3	Credit Value :	3													
4	Prerequisite/co-requisite: (if any)	Nil													
5	Course Learning Outcomes (CLO) :														
	CLO1	Participate effectively in class discussions using stimulus given. (A2, PLO9)													
	CLO2	Explain the use of grammar components in various texts. (A3, PLO9)													
	CLO3	Prepare a writing portfolio using the writing process approach. (A4, PLO9)													
6	Course Learning Outcomes (CLO)	Programme Learning Outcomes (PLO)													
		PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12		
	CLO 1									✓					
	CLO 2									✓					
	CLO 3									✓					
7	Course Content Outline														
	Listening Skills														
	<ul style="list-style-type: none">- Listening for contrasting ideas- Listening for examples- Listening for reasons and explanations-Listening for cause and effect- Recognising speaker's attitude, bias, view or intention- Recognising facts and opinions- Making predictions- Making inferences and drawing conclusions- Note completion- Table and Diagram completion- Summarising- Listening for specific information in news report- Listen to understand context in a news report- Summarising information from articles- Identifying adverbs in articles														
	Speaking Skills														
	<ul style="list-style-type: none">- Speaking with confidence and without unnecessary hesitation- Knowledge of discourse, cohesion and coherence and text types- Using language appropriate for the intended purpose and audience- Using grammatical correct language in report- Using correct pronunciation, stress and intonation for a news report- Using varied sentence structures for a news report- Using passive and active sentences in a news report- Using appropriate verbal phrases for a group discussion. (participial phrase)- Using persuasive devices in a group discussion. (flattery, hyperbole, imperative command, rhetorical question)														

	<p>Writing Skills</p> <ul style="list-style-type: none"> - Discursive Writing - Argumentative Essay - Persuasive language in Writing - Proofreading essays or articles - Using cohesive devices in email writing - Organising and developing ideas for email writing - Apply appropriate English expressions in formal emails and letters - Using reported speech in writing minutes of meeting. - Choosing appropriate reported verb and tense in writing minutes of meeting - Using appropriate verbal phrases in writing minutes of meeting (gerund phrase) - Gathering information for minutes of meeting - Introducing reflective writing (Analytical practice where the writer describes an event/scene/thought and adds a personal reflection on its meaning) <p>Grammar</p> <ul style="list-style-type: none"> - Prepositions - Adjectives - Adverbs - Transition markers - Direct & Indirect speech - Sentence Structures <p>Reading and Vocabulary Skills</p> <ul style="list-style-type: none"> - Identifying details and examples to support an argument - Identifying the purpose of a paragraph or text - Interpreting text for author's, intention, attitudes and style - Deducing meaning from context
8	<p>References (include required and further readings, and should be the most current)</p> <ol style="list-style-type: none"> 1. Barker, A 2019, Improve Your Communication Skills, 5th edn, Kogan Page, London. 2. Langan, J 2023, College writing skills with Readings, 11th edn, McGraw-Hill, New York. 3. Stephenson, H, Dummett, P & Hughes, J, 2019, Life: intermediate, 2nd edn, Cengage Learning, Singapore. 4. Theobald, T 2019, Develop your Presentation Skills, 4th edn, Kogan Page, London. 5. Hendra, LA, Ibbotson, M, O'Dell, K, Flores, CC, Lewis, M, Barksdale, JL, Farmer, J, Paramour, A, 2020, Evolve Level 5 Full Contact, Cambridge University Press, Cambridge.

1.	Name of Course :	APPLIED MATHEMATICS FOR TECHNOLOGIST													
	Course Code :	BGMA1223													
2.	Synopsis :	Applied mathematics for technologist concerned with the application of mathematical knowledge in industry and technology. This course aims at exposing students to the conceptual understanding and the application of differential, integration, Laplace, statistics and probability in technology.													
3	Credit Value :	3													
4	Prerequisite/co-requisite: (if any)	NIL													
5	Course Learning Outcomes (CLO) :														
	CLO1	Solve matrices, vector and calculus problems including differentiation and integration. (C3)													
	CLO2	Solve problems involving Laplace Transform. (C3)													
	CLO3	Solve statistical problems including organizing of data, graphical representation, descriptive statistics and probability distribution. (C4)													
6	Course Learning Outcomes (CLO)	Programme Learning Outcomes (PLO)													
		PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12		
	CLO 1	✓													
	CLO 2	✓													
	CLO 3	✓													
7	Course Content Outline														
	Matrices: Introduction, multiplication, determinants, inverse , matrix solution of equations, application of matrix in technology.														
	Vectors: Cartesian components, scalar product, electrostatics, vector product, lines, planes, vector application in technology.														
	Differentiation: Tables of derivatives, higher derivatives, products, parametric and implicit differentiation, Application of differential (Tangents normal, maxima, minima, complex impedance).														
	Integration: Definite integral, area under curve, integration by parts, substitution, partial fractions, trigonometric functions, Applications of integration (Integration of vectors, centre of mass, moment of inertia).														
	The Laplace Transform: Causal functions, transform and inverse, further transforms, solving ODEs, convolution, transfer function.														
	Sets and Probability: Sets, elementary probability, addition and multiplication laws, total probability, Discrete Probability Distributions.														
	Descriptive Statistics: Describing and exploring data, statistical case study in technology.														
8	References (include required and further readings, and should be the most current)		Main references supporting the course 1. Glyn James (2020) Modern Engineering Mathematics, 6th Edition, Pearson. 2. Anthony Croft (2019) Mathematics for engineers, 5th Edition, Pearson. 3. Nur Farhana Sharip (2018) Engineering Mathematics 1, 1st Edition, Oxford Fajar. 4. Zuraini Ibrahim (2018) Engineering Mathematics 2, 1st Edition, Oxford Fajar.												
			Additional references supporting the course 1. A. J. Washington (2018) Basic Technical Mathematics with Calculus, 11th edition, Pearson. 2. John Bird (2014) Engineering Mathematics, 7th edition, Routledge. 3. K.A. Stroud and Dexter J. Booth (2013) Engineering Mathematics, 7th edition, Palgrave Macmillan.												

1.	Name of Course :	INDUSTRIAL AUTOMATION													
	Course Code :	BGMA1233													
2.	Synopsis :	This course provides students the knowledge of industrial automation technologies and practical use of PLC hardware and programming, sensors and transducers, pneumatics, electro-pneumatics, hydraulics and electric motors.													
3	Credit Value :	3													
4	Prerequisite/co-requisite: (if any)	NIL													
5	Course Learning Outcomes (CLO) :														
	CLO1	Describe the basic concepts of industrial automation and the working principles of industrial controllers, sensors and actuators. (C2, PLO1)													
	CLO2	Manipulate sensors, pneumatic and hydraulic actuators, and electric motors in industrial automation systems. (P3, PLO2)													
	CLO3	Design an industrial automation system with the integration of programmable controller, sensors and actuators. (C4, PLO3)													
6	Course Learning Outcomes (CLO)	Programme Learning Outcomes (PLO)													
		PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12		
	CLO 1	✓													
	CLO 2		✓												
	CLO 3			✓											
7	Course Content Outline														
Introduction of Industrial Automation: Industrial automation, Applications, Advantages/Disadvantages, Phases of automated systems, Basic components of an automatic control system, Open-loop and closed-loop control system, Analogue and digital signals, Number system.															
PLC Hardware and Input / Output Devices Wiring Connection: Industrial controllers, PLC systems, PLC architecture, PLC Input/Output modules, Sink/source circuit interface, PLC status, PLC selection. Input Devices: Push Button, Switch, Counting Devices: Counter, Timing Devices: Timer, Heating Devices: Solid State Relay, Heater, Temperature Controller, Output Devices: Indicators, Relays.															
PLC Programming Scan cycle; IEC-61131 programming languages; Addressing I/O; Ladder diagram: Combinational logics, Sequential logics, Boolean logics, Latch circuit; Timer functions: On-delay timer, Off-delay timer, Retentive on-delay timer; Counter functions: Up counter, Down counter, Up-down counter.															
Pneumatics and Electro-pneumatics: Pneumatics power systems and working principles, Directional control valves, Flow control valves, Pressure control valves, Actuators, Symbols, Pneumatic circuit, Electro-pneumatic circuit.															
Hydraulics: Comparison between pneumatics and hydraulics systems, Applications, Hydraulics power systems and working principles, Symbols, Hydraulics fundamental law, Hydraulic circuit.															
Electric Motors: Working principles and control of: AC induction motor, Brushed DC motor, Brushless Permanent Magnet DC motor, Stepper motor, Servo motor.															
Advanced topics: Computer Integrated Manufacturing (CIM), IIOT, SCADA and HMI.															

8	References (include required and further readings, and should be the most current)	<p>Main references supporting the course:</p> <ol style="list-style-type: none"> 1. W. Bolton, (2019), Mechatronics: Electronics Control Systems in Mechanical and Electrical Engineering, 7th Edition, Prentice-Hall. 2. Mehta, B. R., & Reddy Y.j. (2015) Industrial Process Automation Systems Design and Implementation, Elsevier, Oxford. 3. Alan S. Morris, Reza Langari. (2021) Measurement and instrumentation: theory and application, 3rd Ed., Academic Press, Elsevier, Oxford <p>Additional references:</p> <ol style="list-style-type: none"> 1. Groover, M.P., (2016), Automation, Production System and Computer – Integrated Manufacturing, 4th Edition, Global Edition, Pearson. 2. Jack, H., (2010), Automating Manufacturing Systems with PLCs: Ver 7.0.
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1.	Name of Course :	MANUFACTURING TECHNOLOGY													
	Course Code :	BGMA1503													
2.	Synopsis :	This course covers the fundamental principles and practices of the various metal casting and forming processes, extrusion of metals and polymers, injection moulding of polymers, compression and transfer moulding, and blow moulding and casting of polymeric materials. Treatment of the subject focuses on the materials aspects, quality control and economics of each production process.													
3	Credit Value :	3													
4	Prerequisite/co-requisite: (if any)	NIL													
5	Course Learning Outcomes (CLO) :														
	CLO1	Demonstrate an understanding of basic concepts of various manufacturing processes. (C3, PLO1)													
	CLO2	Verify factors affecting the manufacturing processes. (C3, PLO1)													
	CLO3	Diagnose defects in the manufacturing process to improve product quality. (C4, PLO3)													
	CLO4	Manipulate process equipment to perform manufacturing process. (P4, PLO2)													
6	Course Learning Outcomes (CLO)	Programme Learning Outcomes (PLO)													
		PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12		
	CLO 1	✓													
	CLO 2	✓													
	CLO 3			✓											
	CLO 4		✓												
7	Course Content Outline														
	Casting processes - Fundamentals of metal casting, solidification and cooling. Sand casting and other expendable mould casting processes. Various techniques of producing casting - Permanent mould casting, die casting, casting quality and casting defects and their prevention methods.														
	Metal Forming Fundamentals - Hot working Vs Cold working, Recrystallisation, Annealing, Quenching and Tempering. Flow stress, strain rate sensitivity, Friction and Lubrication.														
	Rolling - Principles of Rolling, Process parameter analysis, Various types of rolling mill. Advantages and Disadvantage of various types of Rolling mill. Causes of Defects, Quality Control.														
	Forging - Introduction of Forging operation, Open-die forging, Impression-Die forging, Flashless forging. Advantages and Disadvantages of various types of forging operation. Barrelling effect, Flash formation. Forging dies Design, Material selection for Die, Die failure, causes of defects, Quality Control.														
	Extrusion (Metals and Polymers) - Principles of Metal Extrusion, Types of Extrusion: Direct Extrusion, Indirect extrusion, hydraulic extrusion, Impact extrusion, Hot extrusion and Cold extrusion. Process parameter analysis, Causes of Defects, Quality control. Principles of Polymer extrusion, Components of extruder, Metal flow in Extruder, Causes of defects in Polymer extrusion.														
	Injection Moulding - Principles of Injection moulding, Components of Injection moulding machine, Shrinkage Analysis, Causes of Defects in Injection moulding.														
	Compression moulding. Before moulding, raw materials are mixed and cold pressed into preform. Advantages of Preheating of preform. Fabrication for both thermoplastic and thermosetting polymers can be used, however, its use with thermoplastics is more time consuming and expensive.														

	<p>Blow Moulding process. First, a parison is extruded. The hollow piece is formed by blowing air or steam under pressure into the parison, forcing the tube walls to conform to the contours of the mould.</p>
	<p>Transfer moulding, a variation of compression moulding. This process is used with thermosetting polymers and for pieces having complex geometries.</p>
8	<p>References (include required and further readings, and should be the most current)</p> <div> <p>1. Kalpakjian, S., & Schmid, S. R. (2022). Manufacturing engineering and technology (6th ed., SI units). Harlow, Essex: Pearson. Retrieved from https://tarc.idm.oclc.org/login?url=https://resolver.vitalsource.com/9781292254418</p> <p>2. S. Kalpakjian and Steven R. Schmid, 2020, Manufacturing Engineering and Technology, 8th Edition, Pearson.</p> </div>

1.	Name of Course :	SOLID MODELLING AND 3D PRINTING													
	Course Code :	BGMI1213													
2.	Synopsis :	This course develops knowledge and skills through the use of Computer Aided Design software (Solidworks). Skills including 3D modelling on parts and 3D printer basic prototyping.													
3	Credit Value :	3													
4	Prerequisite/co-requisite: (if any)	NIL													
5	Course Learning Outcomes (CLO) :														
	CLO1	Construct part and assembly 3D models using Solidworks software. (P3)													
	CLO2	Produce part and assembly drawings using Solidworks software. (P4)													
	CLO3	Build a 3D solid model by using additive manufacturing technique. (P4)													
6	Course Learning Outcomes (CLO)	Programme Learning Outcomes (PLO)													
		PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12		
	CLO 1		✓												
	CLO 2		✓												
	CLO 3		✓												
	7	Course Content Outline													
Introduction to solid modelling Understanding and applying the product design intent for creating a solid model															
Engineering design concept Modelling the product desired outlook by using different modelling approach															
Basic Sketching Learning on 2D sketching, dimensions, sketch relations															
Basic Part Modelling Learning on Terminology, details of the Part, filleting, editing Tools, Dimensioning															
Patterning Learning on reference geometry, linear pattern, circular pattern, mirror pattern															
Revolved Features Learning on case study: Handwheel Mass properties, revolved Features															
Orthographic drawing (Part I) Title block, angle of projection, view layout, supporting view															
Orthographic drawing (Part II) Dimensioning rule, Global dimensioning & tolerance (GD & T), assembly drawing															
Editing: Design Changes Learning on part editing, rebuilding tools															
Introduction to additive manufacturing Types of additive manufacturing															
Mini Project															
8		References (include required and further readings, and should be the most current)		"Main references supporting the course 1. SolidWorks Training Manual (Essential), SolidWorks Corporation, 2021 Additional references supporting the course 1. Howard, W.E. and Musto, J.C., 2012. Introduction to Solid Modeling Using SolidWorks 2012. New York, NY : McGraw-Hill. 2. Zhang, J., and Jung, Y.G., 2018. Additive Manufacturing: Materials, Processes, Quantifications and Applications. Oxford : Butterworth-Heinemann, Elsevier."											

1.	Name of Course :	COMPUTER-AIDED DESIGN AND DRAFTING													
	Course Code :	BGMI1242													
2.	Synopsis :	This course aims to familiarise students with computer aided design workflows by equipping them with competencies in draughting and basic 3D modelling. Knowledge of engineering drawing conventions will be presented through CAD software, and tested through exercises and an individual assignment.													
3	Credit Value :	2													
4	Prerequisite/co-requisite: (if any)	NIL													
5	Course Learning Outcomes (CLO) :														
	CLO1	Prepare basic engineering components using manual drawing and CAD software according to BS 8888:2020 (P2, PLO2)													
	CLO2	Reproduce complete working drawings by utilising given technical information. (P3, PLO2)													
6	Course Learning Outcomes (CLO)	Programme Learning Outcomes (PLO)													
		PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12		
	CLO 1		✓												
	CLO 2		✓												
7	Course Content Outline														
"CAD: Using draw/modify toolbar. Setup (snap, grid, unit, limits).Organisation of the AutoCAD screen. Types of coordinate entries. (absolute, relative and polar). Coordinate system icons, title block, block. CAD & Drafting: Introduction to technical drawing, line work and dimensioning"															
"CAD: Using draw/modify toolbar. Creating and editing of points, lines, circles and arcs, standard symbol, text, dimensioning, layers and geometrical construction Drafting: Lettering, line work, scale, dimensioning, units, use of standard symbol and geometrical contruction. "															
Autocad & Drafting: Orthographic projection (first and third angle)															
"CAD & Drafting: Isometric construction, sectional drawing (full sectioning and half sectioning, offset sections and multi-views) and oblique projection "															
3D – wireframe modelling 3D – surface modelling															
3D – solid modelling Plotting drawings															
8	References (include required and further readings, and should be the most current)	"Main references supporting the course 1. Frederick E, (2023), Technical drawing with engineering graphics, 16th edition, Pearson. 2. Wilson R. Nyemba, (2023), Computer aided design [electronic resource] : engineering design and modeling using AutoCAD, CRC Press. 3. Benton, B.C. and Ommura, G, (2021), Mastering AutoCAD 2021 and AutoCADLT2021, Hoboken, N.J.: Autodesk,: Sybex."													

1.	Name of Course :	INTEGRITY AND ANTI-CORRUPTION													
	Course Code :	MPU-3372													
2.	Synopsis :	This course covers the basic concept of corruption, including the value of integrity, anti-corruption, forms of corruption, abuse of power in daily activities and organisations, as well as ways to prevent corruption. Cases related to corruption are discussed. Teaching and learning methods are implemented in the form of ‘experiential learning’ through individual and group activities. At the end of this course, students will be able to understand the practise of integrity, the concept of corruption, anti-corruption, abuse of power, and the prevention of corruption in society and organizations.													
3	Credit Value :	2													
4	Prerequisite/co-requisite: (if any)	Nil													
5	Course Learning Outcomes (CLO) :														
	CLO1	Assume responsibility in upholding integrity and anti-corruption by producing a public service video. (A3, PLO8)													
	CLO2	Integrate ethical values and professionalism in anti-corruption through a case study. (A4, PLO8)													
	CLO3	Present the findings of a case study on corruption and integrity in different settings. (A2, PLO9)													
6	Course Learning Outcomes (CLO)	Programme Learning Outcomes (PLO)													
		PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12		
	CLO 1								✓						
	CLO 2								✓						
	CLO 3									✓					
7	Course Content Outline														
Chapter 1: Overview of the Integrity and Anti-Corruption Course															
- Introduction to Integrity and Anti-Corruption Course															
- The Importance of Integrity and Anti-Corruption Course															
- Background and overall picture of the Integrity and Anti-Corruption Course															
Chapter 2: Integrity is the Core of Nation's Well-being															
- Corporate Governance															
- Human Governance															
- Ethics in Life															
- Definitions of integrity															
- Factors that compromise integrity															
- The fields of work which involve high integrity issues															
- Cultivating Integrity among students															
- Government initiative to enhance public service integrity															
Chapter 3: Avoid Corruption, Pursue Dignity															
- Definition of corruption and anti-corruption															
- Why is corruption a serious crime?															
- Which group of people have high potential to be involved in corruption															
- Mindset of corrupted people															
- The fields of work with high risk of corruption															
- Malaysia’s ranking in Corruption Perception Index (CPI)															
Chapter 4: Agencies Related to the Prevention of Corruption and Cultivating Integrity															
- Malaysian Anti-Corruption Commission (MACC) as the Leading Anti-corruption Agency															
- Other agencies which serve to enhance integrity and governance															
Chapter 5: Corruption According to the MACC Act 2009															
- Various forms of corruption and bribery															
- Corruption offences under MACC Act 2009															
- How do gifts become bribes according to Malaysia's law															
- Acts of Corruption and legal implication															

	<p>Chapter 6: Corporate Liability Offence</p> <ul style="list-style-type: none"> - Corruption offence by commercial organisation in Section 17A MACC Act 2009 - Definition of commercial organisation and parties involved - Punishment for corporate liability offence - Guideline to avoid corporate liability - TRUST principles under Section 17A MACC Act 2009 		
	<p>Chapter 7: White-collar Crimes</p> <ul style="list-style-type: none"> - Definition of white-collar crime - White-collar crime vs blue-collar crime - Effects of white-collar crimes - Examples of white-collar crimes - local and international - Recent white-collar crimes 		
	<p>Chapter 8: Causes, Symptoms and Effects of Corruptions</p> <ul style="list-style-type: none"> - Causes of corruption based on several theories - Symptoms of corruption - Effects of corruption on individual, society and country 		
	<p>Chapter 9: Fight Against Corruption; Reporting corruption, preventive measures and government initiatives</p> <ul style="list-style-type: none"> - Procedure to report corruption - Whistle-blower and witness protection - Corruption prevention measures and tips to avoid corruption - Government initiatives on corruption prevention 		
	<p>Chapter 10: Roles played by Social Institutions in Cultivating Integrity and Anti-Corruption</p> <ul style="list-style-type: none"> - Cultivating Integrity and Anti-Corruption - Roles of family institution - Roles of religious institution - Roles of educational institution - Roles of media 		
8	<table border="1"> <tr> <td data-bbox="185 958 699 1164">References (include required and further readings, and should be the most current)</td> <td data-bbox="699 958 1426 1164"> <ol style="list-style-type: none"> 1. Mohamad Tarmize Abdul Manaf (2021), Handbook on anti-corruption, Putrajaya. 2. Zukanain Abdul Rahman (2020), MACC The history : the battle for corruption-free malaysia, Univeristi Malaya Press. 3. The Center to Combat Corruption and Cronyism (2020), State of corruption power, politics and policies in Malaysia, Gerak Budaya Enterprise. </td> </tr> </table>	References (include required and further readings, and should be the most current)	<ol style="list-style-type: none"> 1. Mohamad Tarmize Abdul Manaf (2021), Handbook on anti-corruption, Putrajaya. 2. Zukanain Abdul Rahman (2020), MACC The history : the battle for corruption-free malaysia, Univeristi Malaya Press. 3. The Center to Combat Corruption and Cronyism (2020), State of corruption power, politics and policies in Malaysia, Gerak Budaya Enterprise.
References (include required and further readings, and should be the most current)	<ol style="list-style-type: none"> 1. Mohamad Tarmize Abdul Manaf (2021), Handbook on anti-corruption, Putrajaya. 2. Zukanain Abdul Rahman (2020), MACC The history : the battle for corruption-free malaysia, Univeristi Malaya Press. 3. The Center to Combat Corruption and Cronyism (2020), State of corruption power, politics and policies in Malaysia, Gerak Budaya Enterprise. 		

1.	Name of Course :	ENTREPRENEURSHIP													
	Course Code :	MPU-3252													
2.	Synopsis :	<p>Entrepreneurs play an important role in bringing in economic changes and advancements to a country's economy. Specifically, job creation has been regarded as one of the major contributions of entrepreneurs. Various efforts have been put forward by governments to encourage entrepreneurial activities, especially for the youths. Offering entrepreneurship education is one of the many plans.</p> <p>This course will provide students with an understanding of the importance of entrepreneurship and the mechanisms to start an entrepreneurial venture. It is intended to mould students into potential entrepreneurs who are able to meet the challenges of the business world. Theories, techniques and practices of entrepreneurship are provided for students to resolve and manage issues related to their ventures.</p> <p>Course Objectives</p> <ol style="list-style-type: none">1. To expose students to the role, nature and approach of entrepreneurship – from creating new ventures to managing businesses.2. To be able to resolve issues related to entrepreneurship activities - financial and non-financial implications of different business operations.3. To prepare students with the skills to develop, write and pitch/implement a business plan.													
3	Credit Value :	2													
4	Prerequisite/co-requisite: (if any)	Nil													
5	Course Learning Outcomes (CLO) :														
	CLO1	Examine the methods of generating new venture ideas in creating new businesses. (C3)													
	CLO2	Describe the critical functional areas and business plans. (A1)													
	CLO3	Propose the new venture idea and business plan to potential financiers and/or investors. (A3)													
6	Course Learning Outcomes (CLO)	Programme Learning Outcomes (PLO)													
		PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12		
	CLO 1	✓													
	CLO 2												✓		
	CLO 3								✓						
7	Course Content Outline														
	Entrepreneurship: definition, evolution and personality														
	Creativity, Innovation and entrepreneurship														
	Understanding Start-up I														
	Understanding Start-up II														
	Preparing a business plan														
	The organisational plan														
	The marketing plan														
	Financial information and management														
	Managing growth														
	ICT as a business tool														
	Contemporary issues														
	Industry Sharing- Pitching Skill														
	8	References (include required and further readings, and should be the most current)	<p>Main references supporting the course</p> <ol style="list-style-type: none">1. Robert D. Hisrich, et al. 2019, Entrepreneurship, 11th edn, McGraw-Hill Education2. Norman MS & Jeffrey R 2018, Essentials of Entrepreneurship and Small Business Management, 9th edn, Pearson												

1.	Name of Course :	CNC TECHNOLOGY AND MACHINING													
	Course Code :	BGMI2114													
2.	Synopsis :	"This course emphasizes on practical skills that consists of four sections, where the first section covers the commissioning of the machine, while the second section covers part programming, simulation using G-codes and M-codes with cycle programming , the third section covers testing and standard machining, whereas the fourth section covers on preventive maintenance and troubleshooting mechanical and electrical issues. "													
3	Credit Value :	4													
4	Prerequisite/co-requisite: (if any)	NIL													
5	Course Learning Outcomes (CLO) :														
	CLO1	Describe the development of CNC Technology and structure of machines. (C2, PLO1)													
	CLO2	"Determine machining parameters and tools specifications to perform machining tasks. (C3, PLO2) "													
	CLO3	"Write part program for CNC machines using machine codes to simulate in CAM software. (C3, PLO2) "													
	CLO4	"Perform machining tasks on CNC machine as per designed requirements. (P2, PLO2) "													
	CLO5	Perform preventive maintenance, mechanical and electrical troubleshooting. (P2, PLO2)													
6	Course Learning Outcomes (CLO)	Programme Learning Outcomes (PLO)													
		PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12		
	CLO 1	✓													
	CLO 2		✓												
	CLO 3		✓												
	CLO 4		✓												
	CLO 5		✓												
7	Course Content Outline														
	Introduction to CNC Technology and Machine Commissioning (History, Characteristics of Machine, Evolution)														
	CNC Operation in Milling and Turning (Coordinate system, numerical control, calculation of speed and feed rate)														
	Part Programming and Machining (G Codes, M codes, canned cycles and programming practices)														
	Preventive Maintenance (Analysis, improving, planning, mechanical and electrical troubleshooting)														
8	References (include required and further readings, and should be the most current)	"1. Evans, Ken 2016. Programming of computer numerically controlled machines, 4th Ed South Norwalk, CT:IndustrialPres 2. CNC machining & turning center programming and operation : including quality in manufacturing / Kelly Curran, Jon Stenerson 2016 3.Michael Fitzpatrick, 2018 Machining and CNC Technology, 4th Edition "													

1.	Name of Course :	STATIC AND DYNAMIC													
	Course Code :	BGM12123													
2.	Synopsis :	This course aims to introduce fundamental and concepts in engineering, based on forces in equilibrium. Topics include force vectors, moment of a force, equilibrium of particle, systems that are not in equilibrium i.e. with velocity and acceleration. Other topics covered are typical kinematics (description of motion) and kinetic (determining motion in problems involving the concepts of force and energy). This course is restricted to 1-D and 2-D planar mechanisms.													
3	Credit Value :	3													
4	Prerequisite/co-requisite: (if any)	NIL													
5	Course Learning Outcomes (CLO) :														
	CLO1	Use the concepts of static equilibrium for particles or rigid bodies subjected to forces in two dimensions. (C3, PLO1)													
	CLO2	Solve kinematics problems in 1D and 2D mechanical systems. (C3, PLO1)													
	CLO3	Solve kinetics problems in 1D and 2D mechanical systems. (C3, PLO3)													
6	Course Learning Outcomes (CLO)	Programme Learning Outcomes (PLO)													
		PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12		
	CLO 1	✓													
	CLO 2	✓													
	CLO 3			✓											
7	Course Content Outline														
"Force, Vectors and Moments: •Mechanics & Fundamental Concepts - The International System of Units (Unit SI) •Scalars and Vectors															
"Equilibrium of a particle: •Condition for equilibrium of a particle •The free-body diagram •Addition of coplanar forces "															
"Kinematics of a Particle: Rectilinear Motion															
"Kinematics of a Particle: Curvilinear Motion • Rectangular Components "															
"Kinematics of a Particle: Curvilinear Motion • Normal and Tangential Components "															
"Kinetics of Particles: Force and Acceleration • Newton's Second Law of Motion • Equation of Motion for a system of Particles															
"Kinetics of Particle: Force and Acceleration • Equations of Motion: Normal and Tangential Coordinates "															
"Kinetics of Particle: Impulse and Momentum • Principle of Linear Impulse and Momentum (1D and 2D)															

8	References (include required and further readings, and should be the most current)	<ul style="list-style-type: none"> • R. C. Hibbeler (2017), Engineering Mechanics: Statics, 14th Edition, Pearson Education Limited, Harlow, U. K • R. C. Hibbeler (2017), Engineering Mechanics: Dynamics, 14th Edition, Pearson Education Limited, Harlow, U. K"
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1.	Name of Course :	STRENGTH OF MATERIALS													
	Course Code :	BGM12153													
2.	Synopsis :	"Technologists must understand the stresses set up in the physical structure of a product and the use of the material, spatial and form properties of the products to withstand these forces safely and economically. This course covers the topics which includes engineering materials, shear force and bending moment for structural, stress and strain in engineering application. "													
3	Credit Value :	3													
4	Prerequisite/co-requisite: (if any)	NIL													
5	Course Learning Outcomes (CLO) :														
	CLO1	Calculate stresses and strains of various components under different load conditions. (C3, PLO1)													
	CLO2	Solve complex strain and stress problems by applying numerical and graphical methods. (C3, PLO3)													
	CLO3	Analyse stress problem through experimental work with the aid of computer software. (C4, PLO3)													
6	Course Learning Outcomes (CLO)	Programme Learning Outcomes (PLO)													
		PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12		
	CLO 1	✓													
	CLO 2			✓											
	CLO 3			✓											
7	Course Content Outline														
" Introduction to Stress and Strain • Yield criteria • Torsion • Von Misses Stress • Viscoelasticity • Modern materials,															
"Shear Forces and Bending Moment • Shear forces and bending moments in laterally loaded beams. • Deflection of beams and shafts. • Bending stress and shear															
" Statically Indeterminate Problems • Solution of statically indeterminate beams. • Expansion due to heat. • Expansion due to normal force.															
" Asymmetrical Bending • Product second moment of area • Principle second moment of area															
"Complex Stress • Mohr's stress circle • Stresses on inclined plane • Principle stresses															

	<p>"Complex Strain</p> <ul style="list-style-type: none"> • Linear Strain for tri-axial Stress State • Principal Stresses in Terms of Strain (2D stresses system) • Relationship between the Elastic Constant E, G, and ν.
	<p>" Torsion</p> <ul style="list-style-type: none"> • Torsion of hollow and solid shafts • Design criteria: Maximum shear stress and
8	<p>References (include required and further readings, and should be the most current)</p> <div data-bbox="699 555 1426 896"> <p>"Main references supporting the course:</p> <ol style="list-style-type: none"> 1. Barry J. Goodno, James M. Gere (2020): Mechanics of Materials, Enhanced Edition, 9th Edition, Cengage Learning, Boston, Massachusetts. 2. Ferdinand P. Beer, Johnston Jr., E. Russell, John T. DeWolf, David Mazurek (2019): Mechanics of Materials, 8th Edition, McGraw-Hill Education, New York, United States. <p>Additional references supporting the course:</p> <ol style="list-style-type: none"> 1. Hibbeler, R.C., (2016): Mechanics of Materials, 10th SI Edition, Pearson/Prentice Hall, Singapore. 2. Pytel, A. & Kiusalaas, J., (2012): Mechanics of Materials, Cengage Learning USA." </div>

1.	Name of Course :	THERMOFLUIDS													
	Course Code :	BGM12133													
2.	Synopsis :	This course covers the fundamentals of thermodynamics and fluid mechanics as well as giving insight to important topics in both fields such as reversible and irreversible thermodynamics process, second law of thermodynamics, PV and TS diagram, thermodynamics cycles, momentum equation in fluid mechanics and Newton's law of viscosity.													
3	Credit Value :	3													
4	Prerequisite/co-requisite: (if any)	NIL													
5	Course Learning Outcomes (CLO) :														
	CLO1	Apply the thermodynamics First Law and Second law for common steady-flow device. (C3, PLO1)													
	CLO2	Solve various fluid flow problems using the Bernoulli Equation. (C3, PLO1)													
	CLO3	Performs laboratory experiments on principles of thermodynamics and fluid mechanics. (P4, PLO2)													
6	Course Learning Outcomes (CLO)	Programme Learning Outcomes (PLO)													
		PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12		
	CLO 1	✓													
	CLO 2	✓													
	CLO 3		✓												
7	Course Content Outline														
Thermodynamics: • Fundamentals of thermodynamics, terminology, properties, processes, cycles, and international sign convention. • Definition of heat, work & power															
Thermodynamics: • First Law of Thermodynamics • Thermodynamic system – close and open systems, cycles. Non-Flow Energy Equation (N.F.E.E) and Steady Flow Energy Equation. (S.F.E.E.)															
Thermodynamics: • Perfect gas and its application.															
Thermodynamics: • Phase change for pure substance. Vapour-liquid, solid phase equilibrium • Determination of thermodynamic properties from steam tables															
Thermodynamics: • Thermodynamic Processes: a) isobaric b) isochoric c) isothermal d)adiabatic e) polytropic processes, P-V diagram															
Thermodynamics: • Second Law of Thermodynamics. Irreversibilities, Planck/ Clausius statements. Entropy and isentropic processes. T-S diagram. • Carnot cycle															
"Fluid Mechanics: • Basic introductory concepts of Fluid Mechanics. Density, specific weight, specific gravity and Archimedes Principle • Fluid pressure and manometry • Pascal's Law"															
"Fluid Mechanics: • Hydrostatic forces on submerged plane centre of gravity, centre of pressure"															
"Fluid Mechanics: • Energy and momentum balances in 1- dimensional systems. Continuity, Bernoulli and Energy Equations and its applications"															
"Fluid Mechanics: • Newton's law of viscosity and application. No slip condition and shear stress in fluids, laminar and turbulent flows, friction factor"															

8	References (include required and further readings, and should be the most current)	<p>"1.Yunus A. Cengel, John M. Cimbala, Robert H. Turner, 2012, Fundamentals of thermal-fluid sciences, 4th ed., McGraw-Hill Education. 2.Claus Borgnakke, Richard E. Sonntag, 2019, Fundamentals of thermodynamics, 10th ed., Wiley</p> <p>3.Merle C. Potter, David C. Wiggert, Bassem Ramadan, 2017, Mechanics of fluids, 5th ed., Cengage Learning.</p> <p>4.Moran, Shapiro, Boetter and Bailey, (2014), Fundamentals of Engineering Thermodynamics, 8th edition, Wiley.</p> <p>5.Fox, R.W., McDonald, A.T., Pritchard, P.J., 2012, Fluid mechanics, 8th Edition, Wiley."</p>
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1.	Name of Course :	FALSAFAH DAN ISU SEMASA													
	Course Code :	MPU-31E3													
2.	Synopsis :	Kursus ini merangkumi hubungan ilmu falsafah dengan Falsafah Pendidikan Kebangsaan dan Rukun Negara. Penggunaan falsafah sebagai alat untuk memurnikan budaya pemikiran dalam kehidupan melalui seni dan kaedah berfikir serta konsep insan. Topik utama dalam falsafah iaitu epistemologi, metafizik dan etika dibincangkan dalam konteks isu semasa. Penekanan diberi kepada falsafah sebagai asas bagi menjalin dialog antara budaya serta memupuk nilai seponya .													
3	Credit Value :	3													
4	Prerequisite/co-requisite: (if any)	Nil													
5	Course Learning Outcomes (CLO) :														
	CLO1	Menjelaskan isu semasa berlandaskan ilmu falsafah, Falsafah Pendidikan Kebangsaan dan Rukun Negara. (C3, PLO11)													
	CLO2	Menerangkan isu semasa berdasarkan aliran pemikiran utama dalam pelbagai aliran falsafah. (A2, PLO9)													
	CLO3	Menganalisis isu semasa melalui perspektif perbandingan falsafah sebagai asas bagi menjalinkan dialog antara budaya. (A4, PLO11)													
6	Course Learning Outcomes (CLO)	Programme Learning Outcomes (PLO)													
		PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12		
	CLO 1											✓			
	CLO 2									✓					
	CLO 3											✓			
7	Course Content Outline														
Bab 1: Pengenalan - Pengenalan Ilmu Falsafah - Falsafah Pendidikan Kebangsaan - Rukun Negara - Falsafah Sejahtera Sebagai Pentafsiran Rukun															
Bab 2: Falsafah dalam Kehidupan - Cabang-cabang Ilmu Falsafah - Falsafah Teoretikal - Falsafah Praktikal - Kemunculan Falsafah-falsafah Baru															
Bab 3: Logik - Peranan Logik dan Pencegahan Falasi (Kesalahan Berfikir) - Deduksi dan Induksi															
Bab 4: Konsep Insan (Psikologi dan Sosiologi) - Asal usul Insan - Hakikat dan Sifat Insan - Potensi-potensi Insan															
Bab 5: Metafizik - Hubungan Insan dengan Alam - Hubungan Insan dengan Tuhan - Sistem-sistem Metafizik - Metafizik untuk Kemajuan Ilmu															
Bab 6: Epistemologi - Perkembangan Epistemologi dan Kesan Terhadap Kehidupan - Pelbagai Kaedah dan Sumber Perolehan Ilmu - Teori-teori tentang Kebenaran - Epistemologi untuk Kegunaan Kehidupan															

	<p>Bab 7: Ideologi dan Isu Semasa</p> <ul style="list-style-type: none"> - Cabaran Ideologi Relativisme Pascamoden - Fenomena dan Manifestasi Relativisme Pascamoden - Implikasi Relativisme Pascamoden dalam Kehidupan - Jawapan Agama dan Tradisi Terhadap Relativisme Pascamoden 	
	<p>Bab 8: Dekolonisasi</p> <ul style="list-style-type: none"> - Kesan Dualisme Cartesian, Antroposentrisme, Insan Ekologikal - Dekolonisasi Dualisme Cartesian, Pemikiran dan Ilmu Antroposentrisme - Menjayakan Insan Bersepadu Sejahtera/ Ekologikal 	
	<p>Bab 9: Kajian Kes Terpilih Falsafah dan Isu Semasa</p>	
8	<p>References (include required and further readings, and should be the most current)</p>	<ol style="list-style-type: none"> 1. Noor Hisham Md Nawi. (2021). Modul Falsafah dan Isu Semasa, Kota Bharu: Penerbit UMK 2. Nor Hanani Ismail, et al (ed). (2021). Falsafah dan Isu Semasa, Sintok: UUM Press 3. Dzulkifli Abdul Razak, Rosnani Hashim. (2020). Pentafsiran Baharu Falsafah Pendidikan Kebangsaan dan Pelaksanaannya Pasca 2020, Kuala Lumpur: IIUM Press

1.	Name of Course :	PENGHAYATAN ETIKA DAN PERADABAN													
	Course Code :	MPU-31T3													
2.	Synopsis :	Kursus ini menjelaskan tentang konsep etika daripada perspektif peradaban yang berbeza bagi mengenal pasti sistem, tahap perkembangan, kemajuan dan kebudayaan merentas bangsa dalam mengukuhkan kesepaduan sosial menurut acuan Malaysia. Selain itu, perbincangan juga berkaitan isu-isu kontemporari dalam aspek ekonomi, politik, sosial, budaya dan alam sekitar daripada perspektif etika dan peradaban yang dapat melahirkan pelajar yang bermoral dan profesional.													
3	Credit Value :	3													
4	Prerequisite/co-requisite: (if any)	Nil													
5	Course Learning Outcomes (CLO) :														
	CLO1	Menjustifikasikan Isu Etika Dan Peradaban Dalam Acuan Malaysia Berdasarkan Senario Semasa. (A3, PLO9)													
	CLO2	Menghubungkaitkan Konsep Etika dan Peradaban dalam Kehidupan Seharian. (A4, PLO9)													
	CLO3	Menganalisis Peranan Etika dan Peradaban dalam Kajian Kes Tempatan dan Antarabangsa. (A4, PLO11)													
6	Course Learning Outcomes (CLO)	Programme Learning Outcomes (PLO)													
		PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12		
	CLO 1									✓					
	CLO 2									✓					
	CLO 3											✓			
	7	Course Content Outline													
Bab 1: Pengenalan Ilmu Ketamadunan <ul style="list-style-type: none">Definisi Ilmu KetamadunanKonsep TamadunHubungan Ilmu Ketamadunan dan Sejarah TamadunHubungan antara Tamadun, Agama, Bangsa dan BudayaPemikiran Ibnu Khaldun															
Bab 2 Konsep Etika & Peradaban <ul style="list-style-type: none">Konsep EtikaPerspektif Agama & Kepercayaan – Hindu, Buddha, Islam, Kolonial & PascaKolonialKonsep Peradaban – Kolonial &															
Bab 3 Etika & Peradaban dalam Masyarakat <ul style="list-style-type: none">KepelbagaianPetempatan MasyarakatGaris Masa Pembentukan Masyarakat Malaysia															
Bab 4 Pemantapan Kesepaduan Nasional Malaysia <ul style="list-style-type: none">Perpaduan: Matlamat Diidamkan															
Bab 5 Pembinaan Peradaban Majmuk Di Malaysia <ul style="list-style-type: none">Perkembangan Sejarah Peradaban Di Alam Melayu															
Bab 6 Perlembagaan Persekutuan – Tapak Integrasi, Wahana Etika & Peradaban <ul style="list-style-type: none">Definisi & Konsep Tapak IntegrasiDefinisi & Konsep PerlembagaanSejarah & Latar Belakang Perlembagaan															

	<p>Bab 7 Teknologi Maklumat & Komunikasi</p> <p>Penggerak Kesepaduan Nasional Di Malaysia</p> <ul style="list-style-type: none">• Evolusi & Pengglobalan Teknologi• Evolusi Teknologi & ICT Di Malaysia• Konsep Hubungan Manusia & Teknologi• Etika & Peradaban Dalam Penggunaan ICT• ICT Tapak Pengukuhan Kesepaduan	
	<p>Bab 8 Peranan Etika & Peradaban</p> <p>Mendokong Tanggungjawab Sosial Di Malaysia</p> <ul style="list-style-type: none">• Konsep Takrifan Harian & Autoriti• Fungsi Etika & Peradaban Dalam Membentuk Tanggungjawab Sosial• Kesedaran Nasional Dalam Tanggungjawab Sosial• Tanggungjawab Sosial Dalam & Luar Negara	
	<p>Bab 9 Cabaran Kelestarian Etika & Peradaban Di Malaysia</p> <ul style="list-style-type: none">• Kelestarian Etika & Peradaban Malaysia• Kedinamikan Etika & Peradaban Malaysia• Hakisan Sosial Ke Atas Kelestarian Etika & Peradaban• Kelansungan Kelestarian Etika & Peradaban – Pembangunan Negara Bangsa & Ketamadunan Malaysia	
8	<p>References (include required and further readings, and should be the most current)</p>	<p>1. Ateerah Abdul Razak, Nur Azuki Yusuff, Zaleha Embong, 2021, Penghayatan Etika dan Peradaban, UMK, Bachok, Kelantan.</p> <p>2. Ahmad Zamil Abdul Khalid (et al), 2021, Penghayatan Etika dan Peradaban, UUM Press, Sintok, Kedah.</p>

1.	Name of Course :	ENGLISH FOR CAREER PREPARATION													
	Course Code :	BJEL2913													
2.	Synopsis :	This course is designed to help students to develop their spoken and written communication skills in English for the tertiary level in preparing them for the real world. (CEFR C1)													
3	Credit Value :	3													
4	Prerequisite/co-requisite: (if any)	Nil													
5	Course Learning Outcomes (CLO) :														
	CLO1	Demonstrate correct sentence structures, grammar and vocabulary in spoken communication (A3, PLO9)													
	CLO2	Demonstrate correct sentence structures, grammar and vocabulary in written communication (A3, PLO9)													
	CLO3	Propose ideas persuasively and critically in correct sentence structures, grammar and vocabulary (A5, PLO9)													
6	Course Learning Outcomes (CLO)	Programme Learning Outcomes (PLO)													
		PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12		
	CLO 1									✓					
	CLO 2									✓					
	CLO 3									✓					
7	Course Content Outline														
<p>Proposal Writing</p> <ul style="list-style-type: none">Types of proposalsReasons for writing proposalsFormat of a proposal <p>Structure and components of proposals</p> <ul style="list-style-type: none">Expressions for proposal writingMaking suggestions and recommendationsReading sample proposals															
<p>Oral Presentation</p> <ul style="list-style-type: none">Types of speechesChoosing a TopicKnowing your audiencePlanning and organising contentTransition markersVisual aidsVocal FeaturesVerbal and non-verbal communicationHandling questionsOvercoming stage frightLanguage tips for an oral presentation															
<p>Job Seeking Skills</p> <ul style="list-style-type: none">Reading and writing job application lettersReading and writing résuméCommon headings for curriculum vitae or résuméUsing action verbs to describe <p>job responsibilities</p> <ul style="list-style-type: none">Types of job interviewsCommonly asked questionsUsing appropriate adjectives to describe personalities during a job interview <p>appearance</p> <ul style="list-style-type: none">Effective body language in a job interviewUnderstanding appropriate interview etiquetteExercises on job-seeking skills															
<ul style="list-style-type: none">Future Tense “will” vs “going to”Preparing for job interviewsDress code and															

	<p>Critical and Analytical Thinking Skills</p> <ul style="list-style-type: none"> • Introduction to critical and analytical thinking skills • Importance of case studies in critical thinking • Tips to answer a case study • Using language of probability • Brainstorming and group problem-solving activities • Presentation of solutions • Giving opinions • Brainstorming and applying problem-solving strategies in work-related situations and case studies • Presentation of solutions • Sample Case study
	<p>Meeting Skills</p> <ul style="list-style-type: none"> • Purpose and procedures • Roles of chairperson, secretary and participants • Meeting Terminologies • Notice of meeting, agenda and minutes • Meeting languages: Form and functions • Managing conflicts and reaching consensus in meetings • Exercise on negotiating skills • Writing minutes • Reported speech: passive voice
8	<p>References (include required and further readings, and should be the most current)</p> <ol style="list-style-type: none"> 1. Yap, YW, Fernandez, B, Aloysious M, Balakrishnan, S & Zainudin, ZZ 2021, Essentials of professional communication: Business and commerce, Cengage Learning, Singapore. Available at: https://www.vitalsource.com/ 2. Kolin, PC 2017, Successful writing at work, 11th edn, Houghton Mifflin, Boston, MA. 3. Chan, M 2020, English for business communication, Routledge, New York. 4. Lynn, W 2018, Ultimate job search: Master the art of finding your ideal job, getting an interview and networking, 5th edn, Kogan Page, London. 5. Thill, JV & Bovee, CL 2017, Excellence in business communication, 12th edn, Harlow, Essex: Pearson.

1.	Name of Course :	PROJECT AND DISSERTATION I													
	Course Code :	BGM12302													
2.	Synopsis :	This course covers project planning, proposal writing and literature review.													
3	Credit Value :	2													
4	Prerequisite/co-requisite: (if any)	NIL													
5	Course Learning Outcomes (CLO) :														
	CLO1	Develop objective(s) of the research through systematic research of problem statement. (C5, PLO3)													
	CLO2	Evaluate the state of the research field by conducting literature review (C6, PLO6)													
	CLO3	Present the findings of the research in the form of proposal (A2, PLO4)													
	CLO4	Demonstrate social responsibility in conducting research (C3, PLO5)													
	CLO5	Perform preliminary studies and pilot testing of the proposed methodology (C5, PLO2)													
6	Course Learning Outcomes (CLO)	Programme Learning Outcomes (PLO)													
		PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12		
	CLO 1			✓											
	CLO 2						✓								
	CLO 3				✓										
	CLO 4					✓									
	CLO 5		✓												
7	Course Content Outline														
	"FYP Guideline Briefing -Objectives and Learning Outcomes - General Information and Procedures														
	Lecture on report formatting using software Editor														
	FYP1 project														
8	References (include required and further readings, and should be the most current)	Refer to Proposal References													

1.	Name of Course :	TOTAL PRODUCTIVE MAINTENANCE													
	Course Code :	BGMA2343													
2.	Synopsis :	This course provides the students the knowledge and concept of Total Productive Maintenance (TPM), application of tools and techniques of TPM; and methodologies to plan, design, implement, measure and improve the approaches in deploying TPM system for continuous improvement, cost reduction and waste elimination in manufacturing environment.													
3	Credit Value :	3													
4	Prerequisite/co-requisite: (if any)	Nil													
5	Course Learning Outcomes (CLO) :														
	CLO1	Describe the core concepts and theories of Total Productive Maintenance (C2, PLO1).													
	CLO2	Apply the tools, techniques and methodologies to implement Total Productive Maintenance system in manufacturing organisations (C3, PLO3).													
	CLO3	Design a roadmap to deploy Total Productive Maintenance system in manufacturing environment (C4, PLO3).													
6	Course Learning Outcomes (CLO)	Programme Learning Outcomes (PLO)													
		PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12		
	CLO 1	✓													
	CLO 2			✓											
	CLO 3			✓											
7	Course Content Outline														
	"Introduction of Total Productive Maintenance (TPM): History and development of TPM, benefits to implement TPM, TPM and Lean Production System, TPM and Six Sigma, 7 types of waste, 8 Pillars of TPM."														
	"Types of Maintenance: Breakdown maintenance, preventive maintenance, predictive maintenance, corrective maintenance"														
	"Overall Equipment Effectiveness (OEE): Planned versus Total Maintenance, Maintainability, Reliability, Equipment FMEA, Equipment Losses and Breakdown Management, Measure of Machine Productivity, 8 Major Equipment Losses, analysis and improvement planning"														
	"8 Pillars of TPM: Pillar 1: 5S Pillar 2: Autonomous Maintenance Pillar 3: Kobetsu Kaizen Pillar 4: Planned Maintenance Pillar 5: Quality Maintenance Pillar 6: Training Pillar 7: Office TPM"														
	"Preparing, Introducing and Institutionalizing TPM: Introducing TPM Deploying TPM"														
	"Hoshin Kanri: Hoshin Kanri Overview Organizational Culture Two Levels of Policy Deployment Planning for Policy Deployment, TPM, Lean Production System and Six Sigma"														
	Case studies of TPM tools and techniques implementation, TPM systems deployment														

8	References (include required and further readings, and should be the most current)	<p>"Main references supporting the course</p> <ol style="list-style-type: none"> 1. Diaz-Reza, J., García-Alcaraz , J., Martínez-Loya, V. (2019). Impact Analysis of Total Productive Maintenance: Critical Success Factors and Benefits, 1st Edition, Springer. 2. Agustiady, T., Cudney, E. (2016). Total Productive Maintenance: Strategies and implementation guides, 1st Edition, CRC Press. <p>Additional references supporting the course</p> <ol style="list-style-type: none"> 1. Borris, S. (2006). Total Productive Maintenance: Proven Strategies and Techniques to Keep Equipment Running at Maximum Efficiency, 1st Edition, McGraw-Hill. <p>"</p>
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1.	Name of Course :	DESIGN OF AUTOMATION SYSTEMS													
	Course Code :	BGMI2363													
2.	Synopsis :	This course covers topics on advance ladder diagram functions, IL and SFC programming, sensors & actuators operation and interface, control panel wiring design. An overview of automation systems design is covered with discussions on industrial applications. Overview on process control, network, SCADA and Industry 4.0 is covered.													
3	Credit Value :	3													
4	Prerequisite/co-requisite: (if any)	BGMA1233													
5	Course Learning Outcomes (CLO) :														
	CLO1	Draw electrical wiring diagram of an automation system according to JIC/IEC standards. (C3, PLO1)													
	CLO2	Assemble a PLC based automation system that includes suitable input/output devices. (P4, PLO3)													
	CLO3	Assemble a SCADA system for process control and monitoring that consists of suitable HMI. (P4, PLO3)													
	CLO4	Assess project activities from simulation design to hardware built-out based on the available resources and timeline management.(C5, PLO7)													
6	Course Learning Outcomes (CLO)	Programme Learning Outcomes (PLO)													
		PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12		
	CLO 1	✓													
	CLO 2			✓											
	CLO 3			✓											
	CLO 4							✓							
7	Course Content Outline														
	PLC Overview Controller; PLC Systems; PLC Architecture; PLC Input/Output Modules; PLC Status; PLC Selection; Scan Cycle; Addressing I/O; Ladder Diagram;; Combinational Logics, Sequential Logics, Latch Circuit														
	Advance PLC Programming Timer Functions; Counter Functions; Data Manipulation Functions; Comparison Functions; Arithmetic Functions; Shift Functions; Program Control Functions														
	Other PLC Programming Languages IEC-61131 Programming Languages; Instruction list (IL); Sequential Function Chart (SFC); Structural Text (ST)														
	Sensors and Actuators: Design Considerations and Interface to PLC Manually Operated Switches: Push Button, Selector Switch, Toggle Switch; Mechanically Operated Switches: Limit Switch, Temperature Switch, Pressure Switch, Level Switch, Reed Switch; Digital Sensors: inductive Proximity Sensor, Capacitive Proximity Sensor, Photoelectric Sensor; Analogue Sensors: Ultrasonic Sensor, Thermocouple; Motor Directions and Speed Control: Relay, Contactor, Variable Frequency Drive, Stepper Motor, Servo Motor; Electro-pneumatic														
	PLC Control Panel Wiring Design IEC/JIC Standards: Symbols, Power Connections, Input Devices Connection to PLC, Output Devices Connection to PLC														
	Automation Systems Design Program Development; Safe System; Commissioning; Fault Finding; Systems Documentation; Industrial Applications: Temperature Control, Valve Sequencing, Car Park Barrier, Conveyor Belt Control, Bottle Packing														
	Process Control, SCADA and Industry 4.0 Type of Processes; Structure of Control Systems; On/Off Control; PID Control, SCADA: Human Machine interface, SCADA Systems, Hardware Components, Network Components, Software Components, Threat to SCADA Systems;Industry 4.0: Definition and Origin, Fourth Industrial Revolution (4IR), State of Industry 4.0, Benefits, Building Blocks, Design Principles, Challenges and Risks														

8	References (include required and further readings, and should be the most current)	<p>Main references supporting the course</p> <ol style="list-style-type: none"> 1. Frank Lamb, (2019), Advanced PLC Hardware & Programming: Hardware and Software Basics, Advanced Techniques & Allen-Bradley and Siemens Platforms, Automation Consulting. 2. Sharma, KLS., (2017), Overview of Industrial Process Automation, 2nd Edition, Elsevier. <p>Additional references supporting the course</p> <ol style="list-style-type: none"> 1. Kamel, K., Kamel, E., (2014), Programmable Logic Controllers: Industrial Control, McGraw-Hill. 2. Petruzella, F. D., (2017), Programmable Logic Controllers, 5th edition, McGraw-Hill.
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1.	Name of Course :	FINITE ELEMENT ANALYSIS													
	Course Code :	BGM12323													
2.	Synopsis :	This course covers the topics which include constitutive equations used in finite element analysis, strain-displacement relationships, local-global co-ordinate transformations, global stiffness matrix and load vectors, Jacobian n-point Gaussian quadrature, numerical integration, and the use of finite element solvers.													
3	Credit Value :	3													
4	Prerequisite/co-requisite: (if any)	BGM12153 STRENGTH OF MATERIALS													
5	Course Learning Outcomes (CLO) :														
	CLO1	Analyse structural problems using finite element analysis. (C4, PLO1)													
	CLO2	Perform finite element analysis under guidance using commercial finite element packages. (P3, PLO2)													
	CLO3	Interpret results obtained from finite element analysis using valid and appropriate assumptions. (C5, PLO3)													
6	Course Learning Outcomes (CLO)	Programme Learning Outcomes (PLO)													
		PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12		
	CLO 1	✓													
	CLO 2		✓												
	CLO 3			✓											
7	Course Content Outline														
	"Basic theories & fundamental concepts i. Numerical techniques and their applications ii. Equilibrium equations of an infinitesimal 3D element iii. Linear constitutive equations iv. Elements & Mesh v. Nodes & degree of freedom vi. Field variable & nodal unknowns vii. Local-global coordinate systems viii. Natural coordinate														
	"Analysis of springs i. Formulation of local stiffness matrix ii. Assembly of local equilibrium equations iii. Assembly of global equilibrium equations iv. Boundary conditions v. Reaction forces at supports vi. Strain displacement matrix vii. Stress-strain relation"														
	"Analysis of bars i. Tension bars ii. Columns														
	"Analysis of Trusses i. Plane trusses ii. Space trusses iii. Stresses due to lack of fit"														
	"Plane stress & plane strain problems i. Constant strain triangle ii. Plane stress problem														
	"Analysis of Beams i. Equivalent nodal forces ii. Deflection at mid-point														
	"Potential energy method i. Principle of virtual work ii. Strain energy stored in a structure														

	<p>"Computational modelling</p> <ul style="list-style-type: none"> i. Standard procedures of computational finite element analysis (FEA) ii. Pre-processing, processors & post-processing iii. Model set-up: Geometry, material properties, boundary conditions & meshing"
	<p>"FEA simulation</p> <ul style="list-style-type: none"> i. Discretization & mesh convergence test ii. Model validation iii. Data collection
8	<div style="display: flex;"> <div style="flex: 1; background-color: #d3d3d3; padding: 5px;"> <p>References (include required and further readings, and should be the most current)</p> </div> <div style="flex: 2; padding: 5px;"> <p>"Main references supporting the course</p> <ol style="list-style-type: none"> 1. Logan, D.L. (2017), A First Course in the Finite Element Method, Sixth Edition, Cengage Learning. 2. Lakshmi Narasaiah, G. (2008), Finite Element Analysis, BS Publications, Hyderabad. <p>Additional references supporting the course</p> <ol style="list-style-type: none"> 1. Chandrupatla T.R. & Belegundu A. D. (2002), Introduction to Finite Elements in Engineering, Prentice Hall, New Jersey. 2. Bhavikatti, S.S. (2005), Finite Element Analysis, New Age International, New Delhi." </div> </div>

1.	Name of Course :	MANAGEMENT AND FINANCE FOR TECHNOLOGIST													
	Course Code :	BGMA2333													
2.	Synopsis :	It is important for technology students to possess the skills and abilities to function as part of society. This course aims to provide the theories and knowledge of management in specific engineering management, so that the students are equipped with the essential knowledge and skill to perform their job functions efficiently and effectively in the future work place.													
3	Credit Value :	3													
4	Prerequisite/co-requisite: (if any)	Nil													
5	Course Learning Outcomes (CLO) :														
	CLO1	Demonstrate the understanding of concept knowledge and application of principles, theories and approaches of management from traditional and contemporary perspectives. (A3 PLO7)													
	CLO2	Demonstrate the understanding of theories, principles, approaches and application of leadership and motivation in technology project management. (A3 PLO9)													
	CLO3	Propose appropriate financial techniques for project evaluation.(A3, PLO7)													
6	Course Learning Outcomes (CLO)	Programme Learning Outcomes (PLO)													
		PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12		
	CLO 1							✓							
	CLO 2									✓					
	CLO 3							✓							
7	Course Content Outline														
"Introduction to managemet •Principles of management • Management and its roles and functions. • Management levels and its associated skills. • Functional and general management "															
"Development of Management •Theory and Practice • Development of traditional and contemporary perspective of management. • Current trends in management practices"															
"Planning and Strategy • Roles and functions of planning • Type and levels of plans in organization • Basic steps in planning • Strategic planning/management and its effects on organizational plans • Current and contemporary approaches in organizational planning"															
"Organizational Design and Culture • Roles and functions of organizing • Fundamental concepts of organizing • Organizational design – the determinants of organizational structure • Organizational design decisions • mechanistic and organic systems • Common organizational design • traditional structure • contemporary structure • specific organizing for engineering activities in organizations. • Culture and its impact on organizational design • Current issues in organizational design															
"Motivating for Performance • Roles and functions of motivation in achieving organizational performance • Theories of motivations – traditional versus and contemporary perspective, content-based versus process-based theories. • Integrating contemporary theories and application of motivation in practice • Current issues in motivation "															

<p>"Leading</p> <ul style="list-style-type: none"> • Roles and functions of leading in organization. • Theories of leading – traditional and contemporary perspective • Various types of leadership styles • Integrating contemporary theories and application of leading in practice. • Current issues in leading" 		
<p>"Managing Groups and Teams</p> <ul style="list-style-type: none"> • Understand teams and groups dynamics • Groups development • Types and use of teams in organization 		
<p>" Managerial Control</p> <ul style="list-style-type: none"> • Roles and functions of controlling • Basic concepts of control • Approaches to control • Control process • Tools for controlling in organizational performance – operational control (e.g. information control, audit), financial control (budgeting, financial ratio) • Dysfunctional aspect in control • Developing effective control system 		
<p>"Financial and Cost Concept for Project Analysis</p> <ul style="list-style-type: none"> • Time value of money • Present / Future / Compound worth of single and annuity value • Interest rate/ the cost of capital / rate of return • Cost concepts, cost classification and cost behaviour • Depreciation and effects of taxes" 		
<p>" Financial Analysis Techniques for projects</p> <ul style="list-style-type: none"> • Developing of project cash flows" 		
<p>" Financial Analysis Techniques for projects</p> <ul style="list-style-type: none"> • Capital Budgeting Techniques - Non-discounted methods 		
<p>"Financial Analysis Techniques for Projects</p> <ul style="list-style-type: none"> • Break Even Analysis" 		
8	<p>References (include required and further readings, and should be the most current)</p>	<p>"Main references supporting the course</p> <ol style="list-style-type: none"> 1. Stephen P. Robbins, Mary A. Coulter, David A. De Cenzo (2020), Fundamentals of Management, 11th Edition, Pearson Education. 2. Thomas Bateman and Robert Konopaske (2021), Management: Leading & Collaborating in a Competitive World, 14th Edition, McGraw Hill 3. John A. White, Kellie S. Grasman, et al, (2020), Fundamentals of Engineering Economic Analysis, 2nd edition, Wiley <p>Additional references supporting the course</p> <ol style="list-style-type: none"> 1. Ricky W. Griffin, Fundamentals of Management (2016) 8th Edition, Cengage Learning 2. Don Newnan, Ted Eschenbach, et al, (2019), Engineering Economic Analysis, 14th Edition, Oxford University Press"

1.	Name of Course :	TECHNOLOGIST AND SOCIETY													
	Course Code :	BGMA2312													
2.	Synopsis :	This course covers ethics and professionalism of a Professional Technologist, impact of technological advancement on society as well as issues on sustainable development.													
3	Credit Value :	2													
4	Prerequisite/co-requisite: (if any)	Nil													
5	Course Learning Outcomes (CLO) :														
	CLO1	Describe the roles and responsibilities, and principles of ethics of a Professional Technologist in relation to society and norms of technological practices. (A1, PLO8)													
	CLO2	Discuss societal, safety, health, legal, cultural and environmental impact by the technological developments in society. (A2, PLO5)													
	CLO3	Discuss issue on use of natural resources and energy in technological practices. (A2, PLO5)													
6	Course Learning Outcomes (CLO)	Programme Learning Outcomes (PLO)													
		PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12		
	CLO 1								✓						
	CLO 2					✓									
	CLO 3					✓									
7	Course Content Outline														
	"Professional Technologist's ethical considerations : The need for a code of ethics, general provisions of such code, codification of ethical considerations in practice and in law, applicability of code of ethics in technological practices."														
	"Route to Professional Technologist registration : Background, elements of approved scheme of academic learning, elements of industrial practice, legal requirements."														
	Workplace responsibilities: Teamwork and communication														
	"Technology and Society : Definition of technology and the role of technology in providing capabilities to society, the response and change of society to new capabilities, technology transfer.."														
	Environmental Ethics: Technology, ecology and economics, Sustainable development														
	Natural resources and energy : Considerations in the use of key natural resources – population, consumption patterns, state of technology and social factor , non-renewable energy and renewable energy														
8	References (include required and further readings, and should be the most current)	<div>"Main references supporting the course</div> <div>1. Nicholas Sakellariou, Rania Milleron (2018) Ethics, Politics, and Whistleblowing in Engineering, CRC Press.</div> <div>2. Gloobal Profession (2018) Professional Engineering: Human Values and Engineering Ethics</div> <div>3. Martin, M. W. & Schinzinger, R., (2005), Ethics in Engineering, McGraw Hill, New York</div> <div>Additional references supporting the course</div> <div>1. Davis, M. L. & Masten, S. J., (2009), Principles of Environmental Engineering and Science, McGraw Hill, New York</div> <div>2 Arazildrus, Shaharin A. Sulaiman, Mohd Faris Khamidi, (2010) Engineers in Society, McGraw Hill"</div>													

1.	Name of Course :	PROJECT AND DISSERTATION II													
	Course Code :	BGM12304													
2.	Synopsis :	This course covers project planning, literature review, project management and implementation, technical writing and oral presentation.													
3	Credit Value :	4													
4	Prerequisite/co-requisite: (if any)	NIL													
5	Course Learning Outcomes (CLO) :														
	CLO1	Develop objective(s) of the research through systematic research of problem statement. (C5, PLO3)													
	CLO2	Evaluate the state of the research field by conducting literature review (C6, PLO6)													
	CLO3	Present the findings of the research in the form of proposal (A2, PLO4)													
	CLO4	Present the thesis in oral presentation. (A2, PLO4)													
	CLO5	Evaluate in depth the most suitable methodology for data collection and to conduct the experimental study. (C6, PLO3)													
	CLO6	Analyse the data and findings of the research obtained through the theoretical and experimental study that leads to valid conclusion. (C4, PLO3)													
	CLO7	Demonstrate social responsibilities in conducting research (C3, PLO5)													
6	Course Learning Outcomes (CLO)	Programme Learning Outcomes (PLO)													
		PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12		
	CLO 1			✓											
	CLO 2						✓								
	CLO 3				✓										
	CLO 4				✓										
	CLO 5			✓											
	CLO 6			✓											
	CLO 7					✓									
	7	Course Content Outline													
FYPII Project															
8	References (include required and further readings, and should be the most current)					Refer to References in Student's Thesis									

1.	Name of Course :	ADVANCES IN INDUSTRIAL REVOLUTION 4.0													
	Course Code :	BGM13523													
2.	Synopsis :	The course covers the topics on the Nine Pillars of Industry 4.0, such as Data Analytics in Manufacturing, Internet of Things, Advances in Robotics in Industry 4.0, Augmented Reality (AR) in Industry 4.0, Additive Manufacturing Technologies and Applications, Advances in Virtual Factory Research and Applications and Cyber Security in Industry 4.0.													
3	Credit Value :	3													
4	Prerequisite/co-requisite: (if any)	N/A													
5	Course Learning Outcomes (CLO) :														
	CLO1	Demonstrate the Conceptual Framework of Industry 4.0. (C3, PLO1)													
	CLO2	Analyse the readiness for Industry 4.0. (C4, PLO3)													
	CLO3	Apply the current IR4.0 technology in manufacturing processes. (C3, PLO3)													
	CLO4	Explain the Sustainability in Implications of Industry 4.0. (C3, PLO5)													
6	Course Learning Outcomes (CLO)	Programme Learning Outcomes (PLO)													
		PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12		
	CLO 1	✓													
	CLO 2			✓											
	CLO 3			✓											
	CLO 4					✓									
7	Course Content Outline														
	Conceptual Framework of Industry 4.0														
	Industry 4.0: Definition and Origin; Fourth Industrial Revolution (4IR); State of Industry 4.0; Benefits; Building Blocks; Design Principles; Challenges and Risks; Nine Pillars of Industry 4.0.														
	Smart and Connected Product Business Models														
	Business Models; Key Business Model Components of Smart and Connected Products; Sustainability in Industry 4.0; Proposed Framework: Value Proposition, IoT Value Creation Layers and Technologies														
	Maturity and Readiness Model for Industry 4.0														
	Existing Industry 4.0 Maturity and Readiness Models: IMPULS — Industrie 4.0 Readiness, Industry 4.0/Digital Operations Self-Assessment, The Connected Enterprise Maturity Model, Industry 4.0 Maturity Model; Proposed Industry 4.0 Maturity Model; An Application in Retail Sector														
Data Analytics in Manufacturing															
Case studies: Power Consumption in Manufacturing, Anomaly Detection in Air Conditioning, Smart Remote Machinery Maintenance Systems with Komatsu, Quality Prediction in Steel Manufacturing, Predicting Drilling Efficiency, Estimation of Manufacturing Cost of Jet Engine Components; Techniques Used for Predictive Analytics; Forecast Accuracy Calculation; Real World Application: Definition of the Problem, Data Gathering and Cleaning, Model Application and Comparisons.															
Internet of Things															
Introduction to Internet of Things (IoT); IoTs Value Creation in Different Industries: Smart Agriculture, Smart City, Smart Life — Wearable Technologies, Smart Health; IoTs Value Creation Barriers: Standards, Security and Privacy Concerns.															

	Advances in Robotics in Industry 4.0	
	Technological Components of Robots: Industrial Robotic Applications, Artificial Intelligence, Internet of Robotic Things, Cloud Robotics, Cognitive Architecture for Cyber-Physical Robotics; Industrial Robotic Applications: Manufacturing, Maintenance, Assembly.	
	Augmented Reality (AR) in Industry 4.0	
	AR Hardware and Software Technology; Industrial Applications of AR: Maintenance, Assembly, Collaborative Operations, Training.	
	Additive Manufacturing (AM) Technologies and Applications	
	Additive Manufacturing Technologies; Application Areas of Additive Manufacturing; Impact of Additive Manufacturing Techniques on Society; 3D Printing.	
	Advances in Virtual Factory Research and Applications	
	Digital Twin: The Virtual Factory Software: Limitations of the Commercial Software.	
8	Cyber Security in Industry 4.0	
	Security Threats and Vulnerabilities of IoT; Industrial Challenges; Evolution of Cyber Attacks; Cases (Cyber-Attacks and Solutions); Strategic Principles of Cyber Security; Cyber Security Measures	
	Blockchain for Industry Revolution	
	Introduction to Blockchain and distributed computing, Blockchain for data management, Smart Contract, Hyperledgers, Application example using blockchain	
8	References (include required and further readings, and should be the most current)	Main references supporting the course: 1. John Soldatos, Oscar Lazaro, Franco Cavadini, (2019), The Digital Shopfloor - Industrial Automation in the Industry 4.0 Era: Performance Analysis and Applications, River Publishers. 2. Ahmed Banafa, (2020), Blockchain technology and applications, River Publishers. 3. Dong-Jin Pyo, Jaejin Hwang, Youngjin Yoon, (2021), Tech Trends of the 4th Industrial Revolution, Mercury Learning and Information.
		Additional references supporting the course: 1. Alp Ustundag, Emre Cevikcan, (2017), Industry 4.0: Managing The Digital Transformation, Springer. 2. Alasdair Gilchrist, (2016), Industry 4.0: The Industrial Internet Of Things, Apress. 3. Klaus Schwab, (2016), The Fourth Industrial Revolution, Penguin. 4. Kate Baucherel, (2020), Blockchain hurricane: origins, applications, and future of blockchain and cryptocurrency, Business Expert Press.

1.	Name of Course :	INDUSTRIAL ROBOTIC SYSTEMS													
	Course Code :	BGMI3114													
2.	Synopsis :	This course covers topics that include the introduction of robotic technology, robotic application, ethical and safety issues, robot kinematics, the microcontroller of robot and sensing and End-of-Arm tooling. This course also provides students the skill and technique to control and program industrial robotics arms including robotic arm simulation.													
3	Credit Value :	4													
4	Prerequisite/co-requisite: (if any)	NIL													
5	Course Learning Outcomes (CLO) :														
	CLO1	Describe the concept, application and advancement of robotics technology in industries. (C3, PLO1)													
	CLO2	Apply forward and inverse kinematics equations for industrial robotic arm motion controlling. (C3, PLO1)													
	CLO3	Control and simulate industrial robotic arm using the embedded programming language. (P5, PLO2)													
	CLO4	Design a microcontroller based robot. (C5, PLO3)													
6	Course Learning Outcomes (CLO)	Programme Learning Outcomes (PLO)													
		PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12		
	CLO 1	✓													
	CLO 2	✓													
	CLO 3		✓												
	CLO 4			✓											
7	Course Content Outline														
"Introduction of Robotic: <ul style="list-style-type: none">• History• Definition of Robots• Classifications of Robots• Types of Robots; Intelligent Robots• Robot Applications (Industrial and non-industrial)• Type of configurations• Degree of freedom• Coordinate systems															
"Robotic Arm Controlling and Programming: <ul style="list-style-type: none">• PTP motion• Circular motion• Linear motion• Multi-axis mouse control• Cartesian Jogging• Axis-specific Jogging• Inputs / Outputs															
"Forward Kinematics: <ul style="list-style-type: none">• Matrix Representation.• Representation of a Point in Space.• Representation of a Vector in Space.• Representation of a Frame at the Origin of a Fixed Reference Frame.• Representation of a Frame Relative to a Fixed Reference Frame.• Representation of a Rigid Body.• Homogeneous Transformation Matrices.• Representation of Transformations.• Representation of a Pure Translation.• Representation of a Pure Rotation about an Axis.• Representation of Combined Transformations.• Transformations Relative to the Rotating Frame.															

	<p>"Inverse Kinematics:</p> <ul style="list-style-type: none"> • Inverse of Transformation Matrices. • Forward and Inverse Kinematics of Robots. • Forward and Inverse Kinematic Equations: Position. • Cartesian (Gantry, Rectangular) Coordinates. • Cylindrical Coordinates. • Spherical Coordinates. • Articulated Coordinates. • Forward and Inverse Kinematic Equations: Orientation. • Roll, Pitch, Yaw (RPY) Angles. • Euler Angles. • Articulated Joints. • Forward and Inverse Kinematic Equations: Position and Orientation. • Denavit-Hartenberg Representation of Forward Kinematic Equations of Robots. • The Inverse Kinematic Solution of Robots. <p>"</p>		
	<p>"Trajectory Planning:</p> <ul style="list-style-type: none"> • Path versus Trajectory. • Joint-Space versus Cartesian-Space Descriptions. • Basics of Trajectory Planning. • Joint-Space Trajectory Planning. • Third-Order Polynomial Trajectory Planning. • Fifth-Order Polynomial Trajectory Planning. <p>"</p>		
	<p>"Robot with Microcontroller:</p> <ul style="list-style-type: none"> • Microprocessor Control of robotics system • Magnetostrictive Actuators. • Electroactive Polymer Actuators (EAP). • Encoders. • Acceleration Sensors. • Force and Pressure Sensors. • Range Finders. • Global Positioning System (GPS). <p>"</p>		
	<p>"Sensing and End-of-Arm tooling:</p> <ul style="list-style-type: none"> • Discusses the various sensors commonly used by robots to gain information about the external environment. • Provides information about various end effectors and tools used to move work pieces from one location to another within a robot's work envelope. <p>"</p>		
8	<table border="1"> <tr> <td data-bbox="183 1202 699 1599">References (include required and further readings, and should be the most current)</td> <td data-bbox="699 1202 1426 1599"> <p>"Main references supporting the course:</p> <ol style="list-style-type: none"> 1. Kevin M. Lynch (2017), Modern Robotics: mechanics, planning, and control, Cambridge University Press. 2. Larry T. Ross, Stephen W. Fardo, and Michael F. Walach (2018), Industrial Robotics Fundamentals: Theory and Applications, 3rd Edition, Pearson G-W Publisher. <p>Additional references supporting the course</p> <ol style="list-style-type: none"> 1. Siegwart, R. (2011). Introduction to Autonomous Mobile Robots (Intelligent Robotics and Autonomous Agents series), the MIT Press. 2. Niku, S. B. (2011), Introduction to Robotics: Analysis, Control, Applications, 2nd Edition, Prentice Hall. <p>"</p> </td> </tr> </table>	References (include required and further readings, and should be the most current)	<p>"Main references supporting the course:</p> <ol style="list-style-type: none"> 1. Kevin M. Lynch (2017), Modern Robotics: mechanics, planning, and control, Cambridge University Press. 2. Larry T. Ross, Stephen W. Fardo, and Michael F. Walach (2018), Industrial Robotics Fundamentals: Theory and Applications, 3rd Edition, Pearson G-W Publisher. <p>Additional references supporting the course</p> <ol style="list-style-type: none"> 1. Siegwart, R. (2011). Introduction to Autonomous Mobile Robots (Intelligent Robotics and Autonomous Agents series), the MIT Press. 2. Niku, S. B. (2011), Introduction to Robotics: Analysis, Control, Applications, 2nd Edition, Prentice Hall. <p>"</p>
References (include required and further readings, and should be the most current)	<p>"Main references supporting the course:</p> <ol style="list-style-type: none"> 1. Kevin M. Lynch (2017), Modern Robotics: mechanics, planning, and control, Cambridge University Press. 2. Larry T. Ross, Stephen W. Fardo, and Michael F. Walach (2018), Industrial Robotics Fundamentals: Theory and Applications, 3rd Edition, Pearson G-W Publisher. <p>Additional references supporting the course</p> <ol style="list-style-type: none"> 1. Siegwart, R. (2011). Introduction to Autonomous Mobile Robots (Intelligent Robotics and Autonomous Agents series), the MIT Press. 2. Niku, S. B. (2011), Introduction to Robotics: Analysis, Control, Applications, 2nd Edition, Prentice Hall. <p>"</p>		

1.	Name of Course :	QUALITY ENGINEERING													
	Course Code :	BGMA2033													
2.	Synopsis :	This course includes topics that cover quality management system (strategic planning, deployment techniques, quality information system (QIS), quality system (ISO9001, audit and cost of quality), product and process design (reliability and maintainability), product and process control (acceptance sampling, measurement system analysis (MSA), measurement and test, metrology), continuous Improvement (seven basic quality control tools, total quality management), quantitative methods and tools (Statistical Process Control (SPC), process and performance capability, fundamentals of design and analysis of experiments.													
3	Credit Value :	3													
4	Prerequisite/co-requisite: (if any)	NIL													
5	Course Learning Outcomes (CLO) :														
	CLO1	Relate the quality concept and the implementation of quality management systems and quality system in manufacturing industries. (C3, PLO1)													
	CLO2	Apply the quantitative methods and tools to maintain product and process control and continuous improvement in manufacturing operations. (C3, PLO3)													
	CLO3	Apply the tools and techniques to maintain and improve process and product reliability. (C3, PLO3)													
	CLO4	Perform experimental works with analytical judgement. (P4, PLO2)													
6	Course Learning Outcomes (CLO)	Programme Learning Outcomes (PLO)													
		PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12		
	CLO 1	✓													
	CLO 2			✓											
	CLO 3			✓											
	CLO 4		✓												
7	Course Content Outline														
	ISO 9001 Quality Management System Certification bodies, documentation and implementation.														
	Control charts Identify, select, construct, and use various control charts, including X-R, X-s, individuals and moving range (ImR or XmR), p, np, c, and u. Analysis of the chart and conclusion on the process.														
	Acceptance sampling Interpret the concepts of producer and consumer risk and related terms, including operating characteristic (OC) curves, acceptable quality limit (AQL) and lot tolerance percent defective (LTPD). Identify, interpret, and apply ANSI/ASQ Z1.4 standards for attributes sampling														
	Quality control tool for continuous improvements 7 basic QC tools.														
	Quality control methodologies for continuous Improvement Total quality management (TQM), Kaizen and Plan-do-check-act (PDCA).														
	Cost of Quality (COQ) Identify and apply COQ concepts, including cost categorization, data collection, reporting, and interpreting results														
	Metrology Apply metrology techniques such as calibration, traceability to calibration standards, measurement error and its sources, and control and maintenance of measurement standards and devices														
	Total Quality Management (TQM) Principles, benefits and implementation of TQM.														

	<p>Process capability study.</p> <p>The importance of process capability study.</p> <p>Specifications and process capability.</p> <p>Collection of data, analysis of data and conclusion on process capability.</p> <p>Process centre and cpk.</p>	
	<p>Reliability and Maintainability. Identify, define, and distinguish between the basic elements of reliability models such as exponential, Weibull, and bathtub curve. Review and analyze indices such as MTTF, MTBF, MTTR, availability, and failure rate. Define, construct, and interpret the results of failure mode and effects analysis (FMEA)</p>	
	<p>Measurement System Analysis (MSA). Calculate, analyze, and interpret repeatability and reproducibility (gage R&R) studies,</p>	
	<p>Design and Analysis of Experiments. Terminology, Planning and organizing experiments, One-factor experiments, Full-factorial experiments, Two-level fractional factorial experiments.</p>	
	<p>8 References (include required and further readings, and should be the most current)</p>	<p>1. Douglas C. Montgomery (2020). Introduction to statistical quality control. 8th Edition, Wiley.</p> <p>2. Furterer, S. L. (2022). The ASQ Certified Quality Process Analyst Handbook (3rd ed.). La Vergne: ASQ Quality Press. Retrieved from https://tarc.idm.oclc.org/login?url=https://ebookcentral.proquest.com/lib/tarc-ebooks/detail.action?docID=7158719</p> <p>3. Laman, S. A. (Ed.). (2022). The ASQ Certified Quality Engineer Handbook (5th ed.). Milwaukee, Wisconsin: ASQ Excellence. Retrieved from https://tarc.idm.oclc.org/login?url=https://ebookcentral.proquest.com/lib/tarc-ebooks/detail.action?docID=7158747</p>

1.	Name of Course :	MANUFACTURING AND OPERATIONS MANAGEMENT													
	Course Code :	BGMA3433													
2.	Synopsis :	This course covers topics that are closely related to process design and layout, inventory control systems, manufacturing planning & control and operations research techniques.													
3	Credit Value :	3													
4	Prerequisite/co-requisite: (if any)	NONE													
5	Course Learning Outcomes (CLO) :														
	CLO1	Apply process design and facilities layout in different manufacturing environment. (C3, PLO3)													
	CLO2	Analyse inventory control system in both make or buy environment. (C4, PLO3)													
	CLO3	Analyse for production planning and control in different manufacturing environment. (C4, PLO3)													
	CLO4	Apply various operations research techniques for resources management. (C4, PLO3)													
6	Course Learning Outcomes (CLO)	Programme Learning Outcomes (PLO)													
		PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12		
	CLO 1			✓											
	CLO 2			✓											
	CLO 3			✓											
	CLO 4			✓											
7	Course Content Outline														
	Process Design and Layout														
	Jobbing, batch, line and cellular manufacturing.														
	Types of layout and designing process oriented layout.														
	Inventory control systems														
	Economic order quantity with quantity discount and variation in holding cost														
	Probabilistic model														
	Production planning and control systems														
	Forecasting														
	Capacity Planning														
Operations Research Techniques															
Linear programming, the simplex method;															
Solving transportation and assignment problems.															
Fundamental dynamic programming, workforce size model and workforce allocation problem															
Field trip															

8	References (include required and further readings, and should be the most current)	<p>Main references supporting the course</p> <p>Heizer, J.& Render, B., (2020), Operations Management Sustainability and Supply Chain Management, 13th Edition, Pearson</p> <p>Robert Jacobs, F., Berry, W. L., Clay Whybark, D. & Vollmann T. E. (2018), Manufacturing Planning and Control for Supply Chain Management: the CPIM reference, 2nd Edition, Mc Graw Hill Education</p> <p>Groover, M. P., (2016), Automation, Production Systems, and Computer Integrated Manufacturing, 4th Edition, Pearson, Harlow, Essex.</p> <p>Mukhopadhyay, S. K., (2013), Production Planning and Control – Text and Cases, 2nd Edition, Prentice Hall India</p> <p>Taha, H. A., (2017), Operations research: an introduction, 10th Edition, global Edition, Pearson, Harlow, Essex.</p> <p>Additional references supporting the course</p> <p>Stevenson, W. J., (2021), Operations Management, 14th Edition, McGraw Hill Education</p>
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1.	Name of Course :	MANUFACTURING PROCESSES, SYSTEM UNDERSTANDING AND MANAGEMENT SYSTEM													
	Course Code :	BGMA4104													
2.	Synopsis :	This course provides a work-based learning experience with Kian Joo Can Factory Berhad. It covers a thorough introduction to the tin can manufacturing process, including ERP system, MES system, procurement processes, control system, maintenance management system, stock inventory control and logistic fleet management. Throughout this course, students can develop industry-specific knowledge and skills such as problem-solving skills (with Fish Bone Chart, 5W1H and FMEA) and people management skills from the workplace environment.													
3	Credit Value :	5													
4	Prerequisite/co-requisite: (if any)	Nil													
5	Course Learning Outcomes (CLO) :														
	CLO1	Practice the manufacturing technologies, processes and management systems compliance to the ISO standards and requirements in the tin can manufacturing industry. (A2, PLO7)													
	CLO2	Perform the maintenance diagnosis and data analysis in the tin can manufacturing industry. (P4, PLO2)													
	CLO3	Demonstrate the problems solving skills in the manufacturing operations. (A3, PLO3)													
	CLO4	Demonstrate the ability to work and communicate effectively in a workgroup. (A3, PLO9)													
6	Course Learning Outcomes (CLO)	Programme Learning Outcomes (PLO)													
		PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12		
	CLO 1						✓								
	CLO 2		✓												
	CLO 3			✓											
	CLO 4									✓					
7	Course Content Outline														
Introduction of tin can manufacturing															
"Overall tin can Manufacturing Process System Understanding, a. Understanding of tin can order processing (ERP system), b. Manufacturing Execution System (MES system) c. Procurement Processes d. Process Control System – ISO 22000, FSSC 22000 e. Maintenance Management System i. Breakdown Maintenance ii. Preventive Maintenance iii. Predictive Maintenance iv. Asset registrations/ cost center v. Spare part management vi. Spare part purchase work flow vii. Maintenance diagnosis data analysis															
"Problem Solving Skill a. Fish Bone Chart b. 5W1H c. FMEA"															
"People Management Skill a. Leadership b. Team work"															
8	References (include required and further readings, and should be the most current)						Refer to the reference list in the student’s submitted WBL report.								

1.	Name of Course :	PRINTING PROCESSES, CONTROL AND AUTOMATION													
	Course Code :	BGMA4114													
2.	Synopsis :	This course provides a work-based learning experience with Kian Joo Can Factory Berhad. This course offers a different perspective and a context for academic learning, an opportunity to put theory into practice. The first part of this course aims to develop an understanding of key features of the printing process such as printing technologies, type of printing, prepress and proofing processes and oven machine operation. The second part of this course covers the nature and behaviour of raw materials, the selection of variables to be controlled, together with the insight on the control systems. The control systems to be introduced are prepress, proofing, coating, printing, quality and traceability control systems. The last part of the course focuses on automation technologies, including the fundamental understanding of automation and industrial automation control systems.													
3	Credit Value :	5													
4	Prerequisite/co-requisite: (if any)	Nil													
5	Course Learning Outcomes (CLO) :														
	CLO1	Practice the printing technologies and processes in the tin can manufacturing industry. (P3, PLO2)													
	CLO2	Adhere the traceability and quality control systems for the printing processes in the tin can manufacturing industry. (A4, PLO8)													
	CLO3	Perform maintenances on mechanical drive systems and industrial automation control systems in the printing operations for the tin can manufacturing industry. (P4, PLO2)													
6	Course Learning Outcomes (CLO)	Programme Learning Outcomes (PLO)													
		PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12		
	CLO 1		✓												
	CLO 2								✓						
	CLO 3		✓												
7	Course Content Outline														
Printing technology and type of printing															
Prepress and Proofing processes															
Oven machine operation and functioning understanding															
Off-Set Printing Processes															
"Raw material specification and In coming control understanding a. Tinplate : Size, thickness, temper, tin coating, finishing, type of Annealing, Oiling, Passivation - application b. Coating/ Lacquer : Type, application, functionality c. Ink : Type , color control d. Rubber roller e. Dampening water : Fountain solution, alcohol , conductivity, PH, temp. control"															
"In Process Control Understanding a. Prepress process control b. Proofing process control c. Coating process control d. Printing process control e. Quality ON HOLD disposition"															
Finished printed/ coated sheets quality control															
Product Traceability Control System															

	<p>"Automation - Mechanical Drive System functional</p> <ul style="list-style-type: none"> a. Gear system b. Belt system c. Drive system Alignment d. Bearing system : type, application, repair"
	<p>"Industrial Automation Control</p> <ul style="list-style-type: none"> a. Understanding of Pneumatic Control System b. Understanding of Hydraulic Control System c. Understanding of servo/ motor/ inverter drive Control System d. Understanding of Electrical PLC control System"
8	<p>References (include required and further readings, and should be the most current)</p> <p>Refer to the reference list in the student's submitted WBL report.</p>

1.	Name of Course :	TIN CAN PROCESSES, CONTROL AND AUTOMATION													
	Course Code :	BGMA4124													
2.	Synopsis :	"This course provides a work-based learning experience with Kian Joo Can Factory Berhad. It covers advanced processing, control system and automation of tin can manufacturing. This course begins with the introduction of tin can processes such as slitting, component punching and tin can forming processes. Next, the specification of raw material and in- process control will be covered. Automation of mechanical drive system together with the automation control system will be introduced as well. This course ultimately aims to build confidence about what the students have learned and prepare them for their future careers."													
3	Credit Value :	5													
4	Prerequisite/co-requisite: (if any)	Nil													
5	Course Learning Outcomes (CLO) :														
	CLO1	Practice the tin can processes and lean manufacturing systems in the tin can manufacturing industry. (P3, PLO2)													
	CLO2	Execute the traceability and quality control systems for the tin can processes. (P4, PLO8)													
	CLO3	Perform the tooling design and maintenance operations using modern tools. (P5, PLO2)													
	CLO4	Execute maintenances on mechanical drive systems and industrial automation control systems in the tin can processes. (P4, PLO2)													
	CLO5	Demonstrate the ability to communicate and work effectively in a workgroup. (A3, PLO9)													
6	Course Learning Outcomes (CLO)	Programme Learning Outcomes (PLO)													
		PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12		
	CLO 1		✓												
	CLO 2								✓						
	CLO 3			✓											
	CLO 4			✓											
	CLO 5									✓					
7	Course Content Outline														
	Slitting Processes														
	Components Punching Processes														
	Tin Can Forming Processes														
	"Raw material specification and In coming control understanding, a. Coated / Printed sheets specification and quality check b. Other components / raw materials such as Copper wire, Lining compound, Aluminum foil ,Packing materials etc in coming control"														
	In Process Control Understanding														
	Product Traceability Control System														
	"Tooling design and maintenance a. Structure of tooling and design b. Functioning of each part of tooling c. Material selection and hardening process"														

	"Stamping Press machine a. Type of stamping press and it application b. Stamping presses functioning c. Stamping press maintenance and control"	
	"Automation - Mechanical Drive System functional a. Chain system b. Pulley system c. V-Belt"	
	"Industrial Automation Control a. Understanding of Pneumatic Control System b. Understanding of Hydraulic Control System c. Understanding of servo/motor/ inverter drive Control System d. Understanding of Electrical PLC control System e. Understanding of Robotic / Cobot system work"	
	Lean Manufacturing System Understanding	
	People Management Skill	
8	References (include required and further readings, and should be the most current)	Refer to the reference list in the student's submitted WBL report.

1.	Name of Course :	INDUSTRIAL TRAINING														
	Course Code :	BGMI491C														
2.	Synopsis :	"This course involves minimum 24 weeks attachment in the industry which will expose students to the actual working environment where students will be treated as part of the workforce and bound to the rules and regulations of the organization. In general, the aim of industrial training is to give exposure, experience and professional skills to various aspects of engineering disciplines in related industries. The students are also expected to be familiarized with efficient, accountable and ethical conduct as they will be supervised directly under the company's personnel."														
3	Credit Value :	12														
4	Prerequisite/co-requisite: (if any)	nil														
5	Course Learning Outcomes (CLO) :															
	CLO1	Apply relevant technical knowledge in accordance to industry practice. (C3, PLO1)														
	CLO2	Commit in industrial activities within resources given. (A3, PLO7)														
	CLO3	Demonstrate good attitude and ethics in accordance with professional practice. (A3, PLO8)														
	CLO4	Demonstrate competency in communication skills at workplace. (A3, PLO4)														
	CLO5	Demonstrate the ability to work effectively in a workgroup. (A3, PLO9)														
	CLO6	Demonstrate the awareness of the latest changes in technological world. (A1, PLO6)														
	6	Course Learning Outcomes (CLO)	Programme Learning Outcomes (PLO)													
			PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12		
		CLO 1	✓													
		CLO 2							✓							
		CLO 3								✓						
CLO 4					✓											
CLO 5										✓						
CLO 6							✓									
7	Course Content Outline															
	"Pre-application briefing on guidelines and procedure for internship application. Pre-training briefing on guidelines and procedure during training and after training Students will participate in daily engineering activities and processes of the organisation such as production, design, maintenance, service, installation, collecting and analysis of data, coordinating group activities, attending meetings and discussions, etc."															
8	References (include required and further readings, and should be the most current)						Refer to References in Student's Training Report									