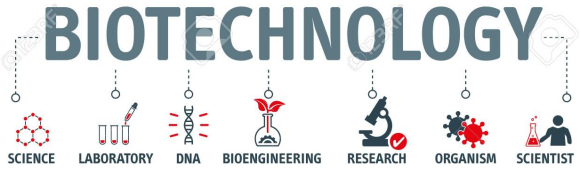
POLITENIK NILAI

DIPLOMA IN BIOTECHNOLOGY

STUDENT GUIDEBOOK



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ABOUT POLITEKNIK NILAI

Politeknik Nilai Negeri Sembilan (PNS) is the 23rd polytechnic established under the Ministry of Higher Education Malaysia on 1 April 2007, under the 9th Malaysia Plan. PNS started operating on a temporary campus with first intake students in December 2007.

PNS moved to a permanent campus at Kompleks Pendidikan Bandar Enstek, Negeri Sembilan in September 2011. This campus is built on a 101.5-acre site consist of administration, lecture complex, academics, Islamic center, hostel, and cafeteria building blocks. This campus can accommodate 2,400 students with a capacity of 1,200 staying in-campus students.

PNS consists of three main academic departments; which are Jabatan Agroteknologi & Bio-Industri (JAB), Jabatan Perdagangan (JP), Jabatan Kejuruteraan Mekanikal (JKM) and supported by two other departments; Jabatan Pengajian Am (JPA) and Jabatan Matematik, Sains, dan Komputer (JMSK).

Below is the list of programmes offered:

JABATAN AGROTEKNOLOGI DAN BIO-INDUSTRI

Diploma in Biotechnology (DBT)

Diploma in Landscape Horticulture (DLH)

JABATAN PERDAGANGAN

Diploma in Islamic Banking and Finance (DIB)

Diploma in Logistics and Supply Chain Management (DLS)

Diploma in Retail Management (DRM)

Diploma in Business Studies (e-Commerce) (DBS)

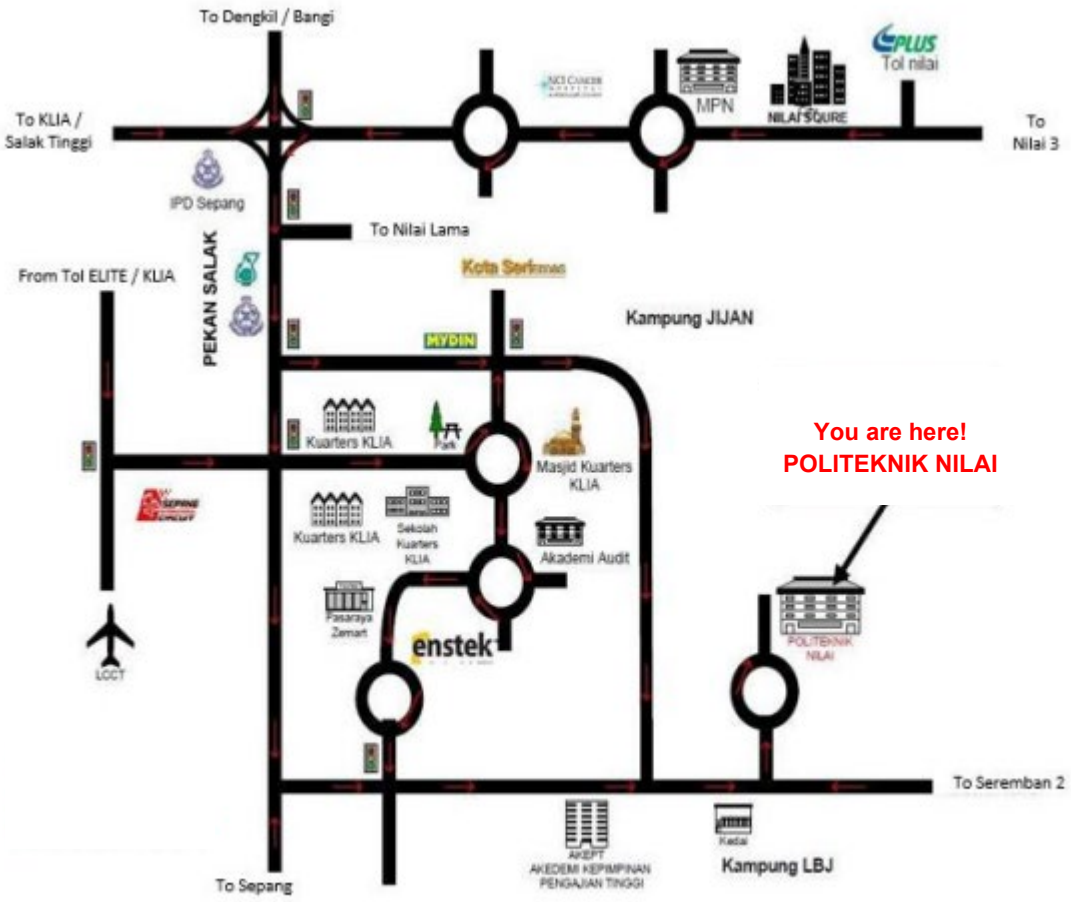
JABATAN KEJURUTERAAN MEKANIKAL

Diploma in Mechanical Engineering (DKM)

Diploma in Mechatronic Engineering (DEM)

VISION AND MISSION

LOCATION AND CONTACT DETAILS



Politeknik Nilai, Kompleks Pendidikan Bandar Enstek, 71760 Bandar Enstek,

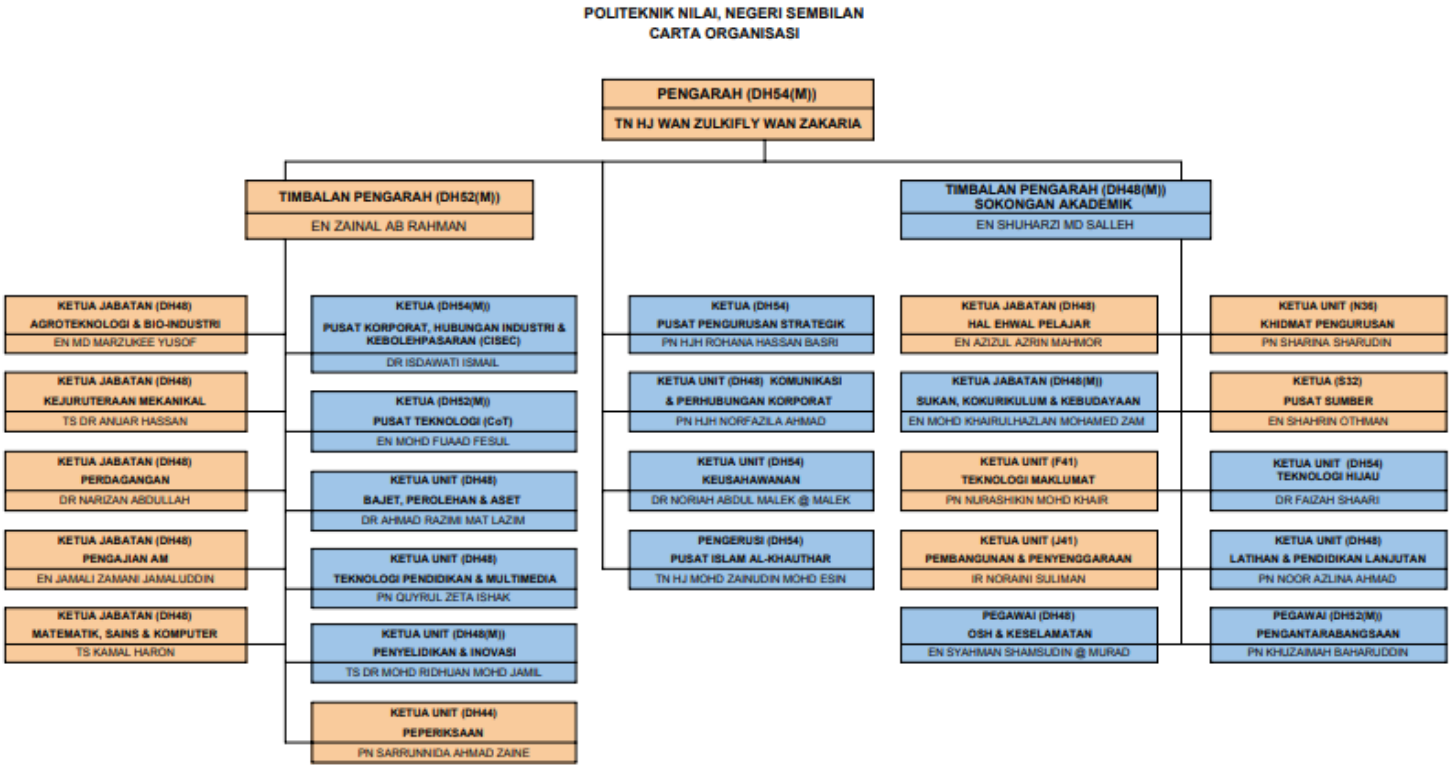
06-7980400

06-7911269

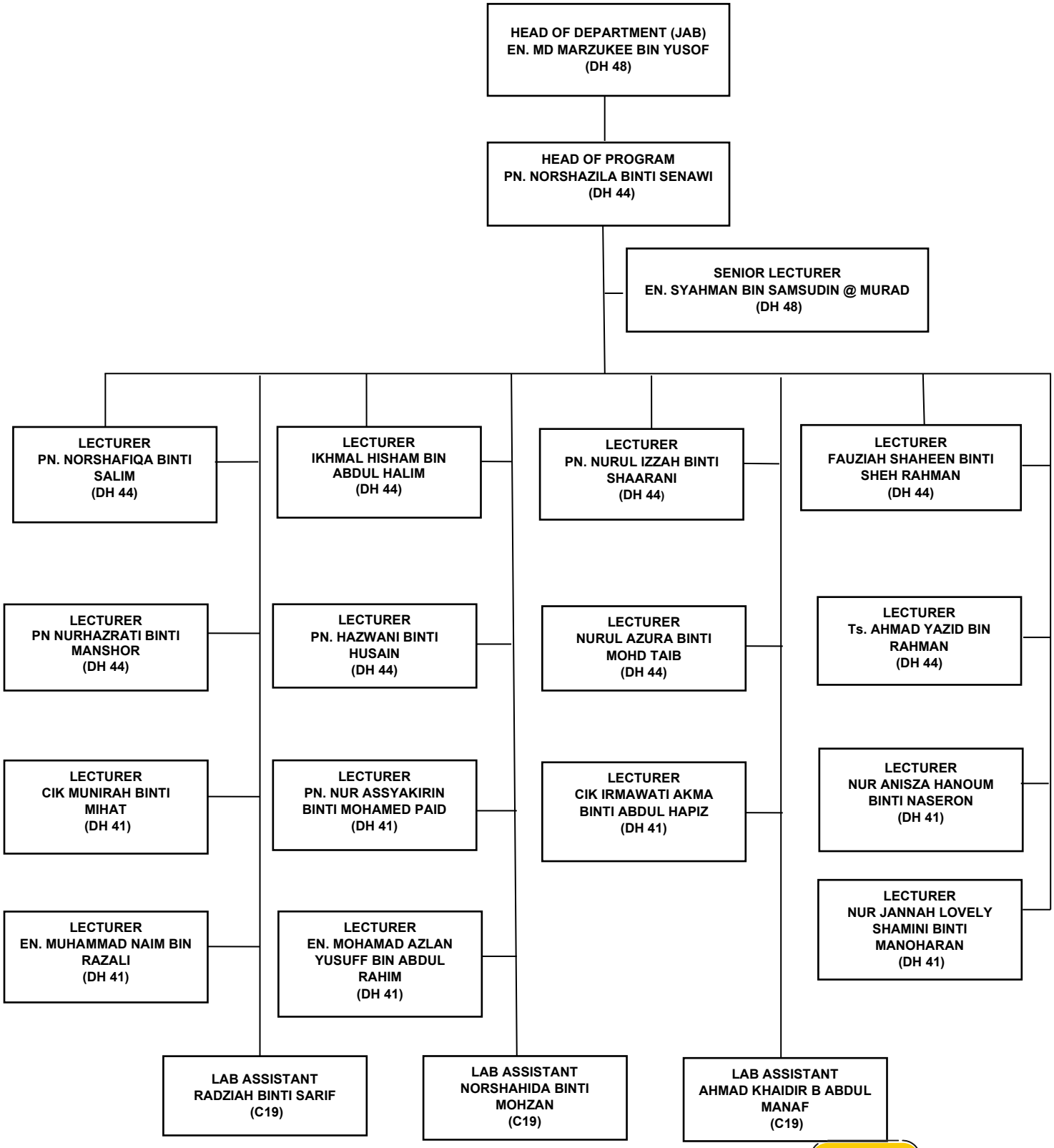
http://pns.mypolycc.edu.my

webmasterpns@polinilai.edu.my

POLITEKNIK NILAI ORGANIZATION CHART



BIOTECHNOLOGY UNIT ORGANIZATION CHART



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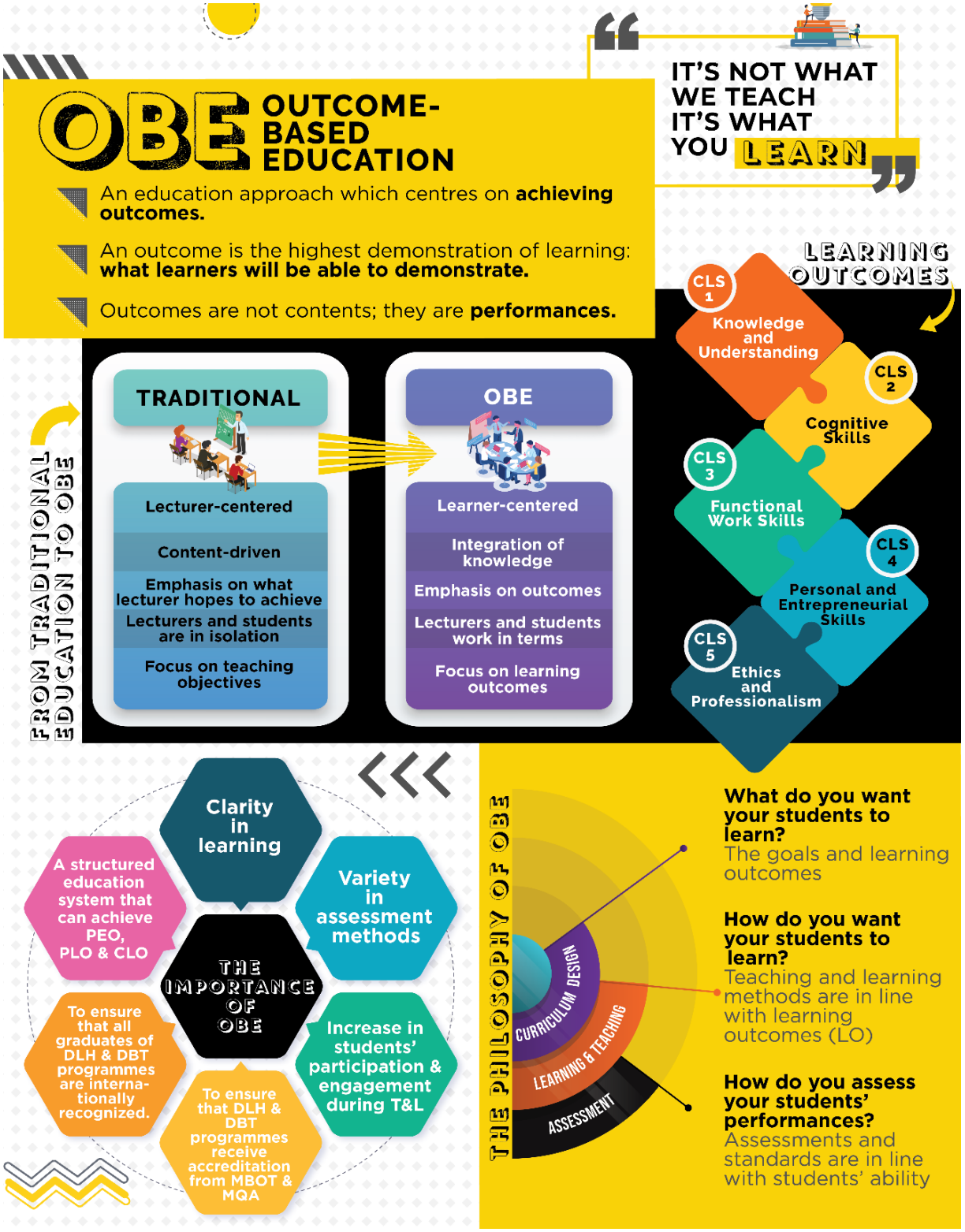
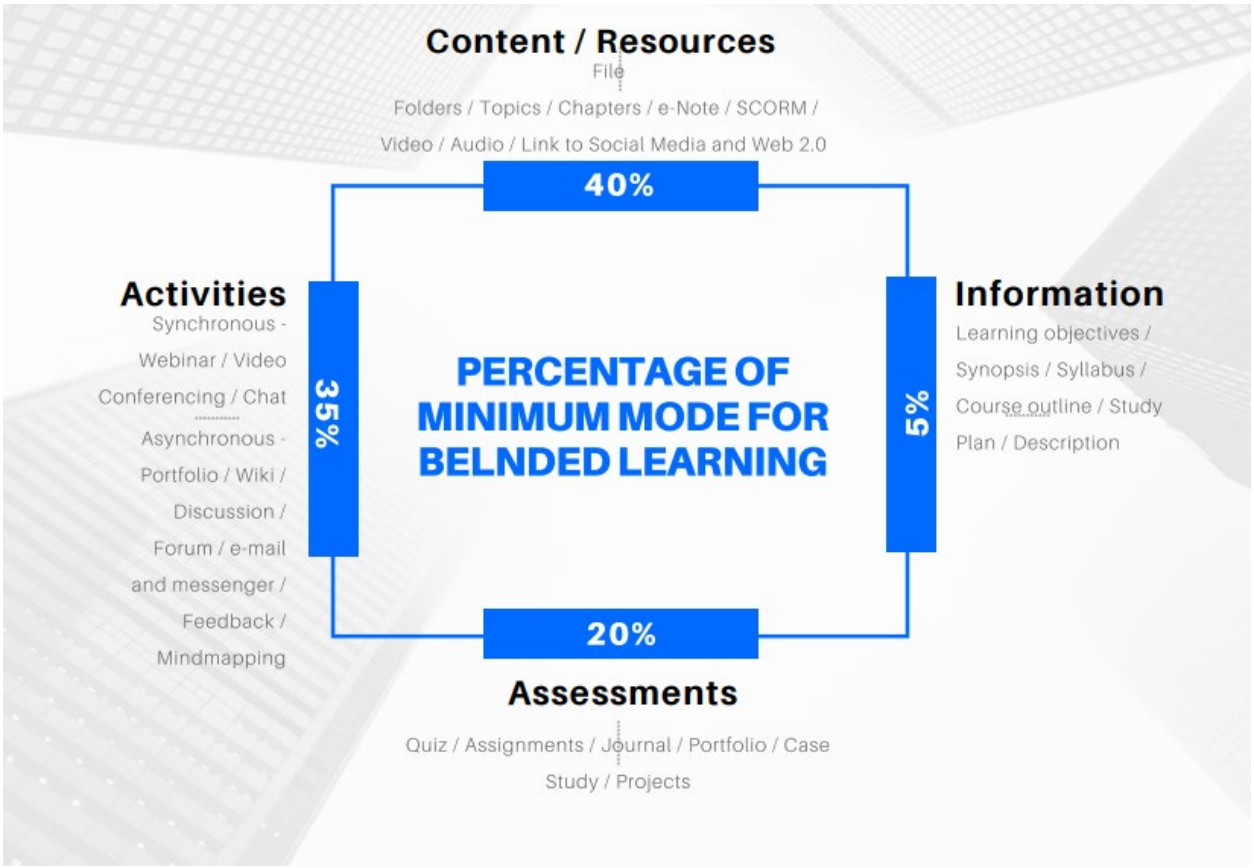
OUTCOME BASED EDUCATION (OBE)



BLENDED LEARNING

Blended learning is a method in teaching and learning which integrates a mixture of online and on-site mode of learning. This teaching approach can be used either to facilitates or replace the face to face of student's learning session. The weightage of 30% to 80% in blended learning can be achieved when the course and activities are conducted through online.



PORTAL CIDOS e-LEARNING

CIDOS

CIDOS (e-Learning) is an interactive online educational system which provides platform for lecturers and students to create quality materials for online learning

THE CIDOS SYSTEM CAN BE BROWSED THROUGH LMS 3.5

HTTP://CIDOS.EDU.MY

Click AND PLAY

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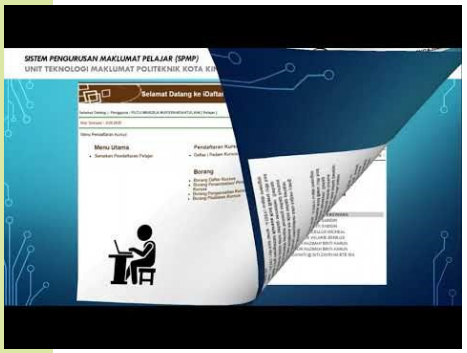
PORTAL SPMP


SISTEM SPMP
SISTEM PENGURUSAN MAKLUMAT POLITEKNIK
Anda Pelajar Baharu Yang Telah Mendapat Tawaran Pengajian di Politeknik Nilai Negeri Sembilan?
Jika Jawapannya 'YA', Tahniah Diucapkan!
Sila Klik Pautan Dibawah Untuk Meneruskan Pendaftaran :
PENDAFTARAN ON-LINE PELAJAR BAHARU
TUKAR & LUPA KATALALUAN
Sila tukar password selepas selepas kali pertama log masuk. Gunakan password selain dari nombor pendaftaran anda.
**Pelajar yang Lupa Password, sila berhubung dengan Penasihat Akademik masing-masing
Selamat Datang :
No.KP :
Katalaluan / No. Pend :
Login Pengguna
Makluman:
Pelajar adalah diminta untuk menggunakan No.KP dan No.Pendaftaran(huruf besar) untuk KALI PERTAMA login ke portal ini. Seterusnya mohon untuk menukar katalaluan dengan menggunakan 6 hingga 8 aksara sahaja. Bagi para pensyarah/staf, sila gunakan no.kpb dan katalaluan masing-masing. Sebarang masalah, sila majukan kepada administrator...
SPMP
Sistem Pengurusan Maklumat Politeknik
Politeknik Nilai, Negeri Sembilan
HTTP://SPMP.POLINILAI.EDU.MY


Click
AND
PLAY


SISTEM PENGURUSAN MAKLUMAT PELAJAR (SPMP)

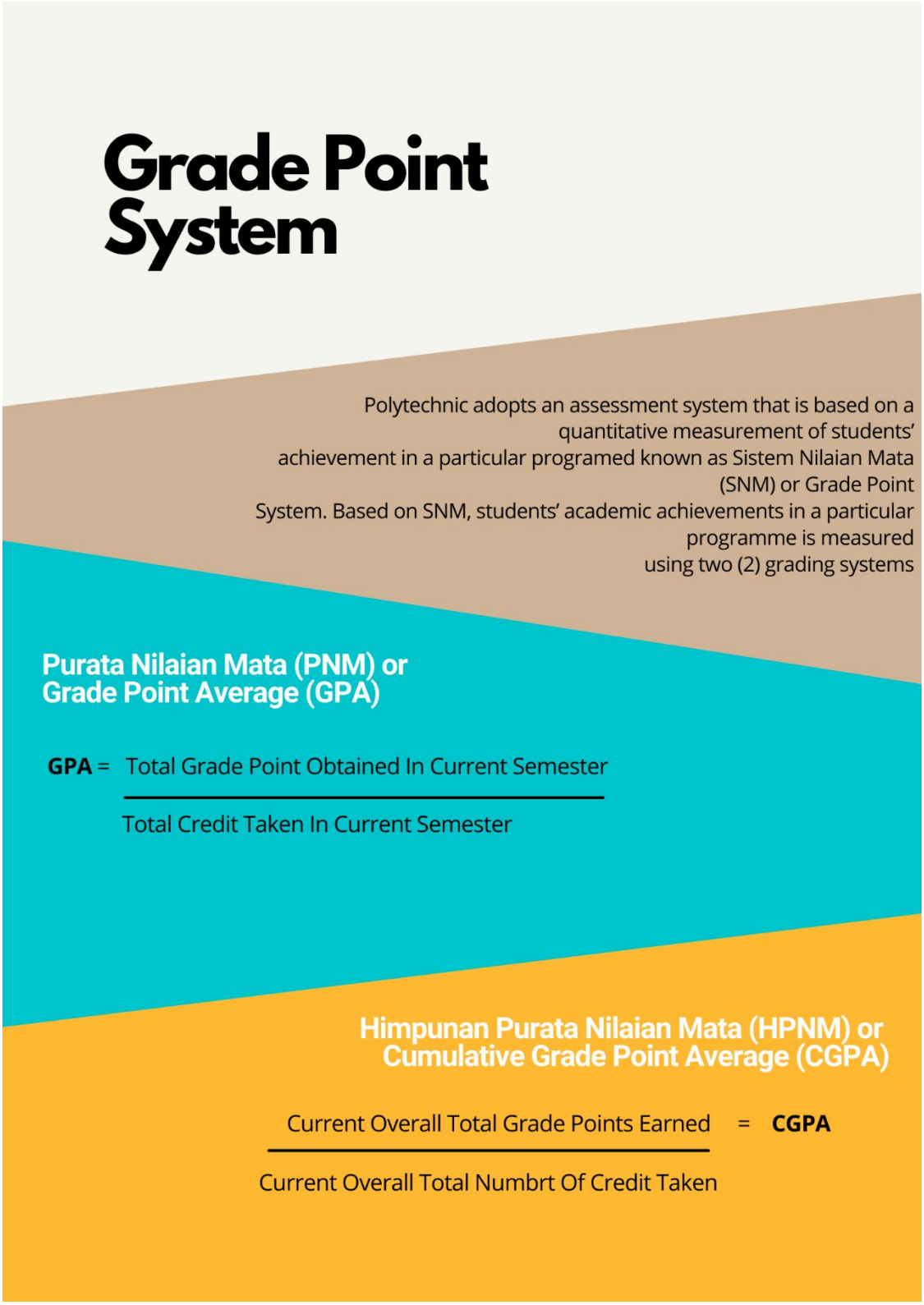
EXAMINATION

GRADING SCHEME

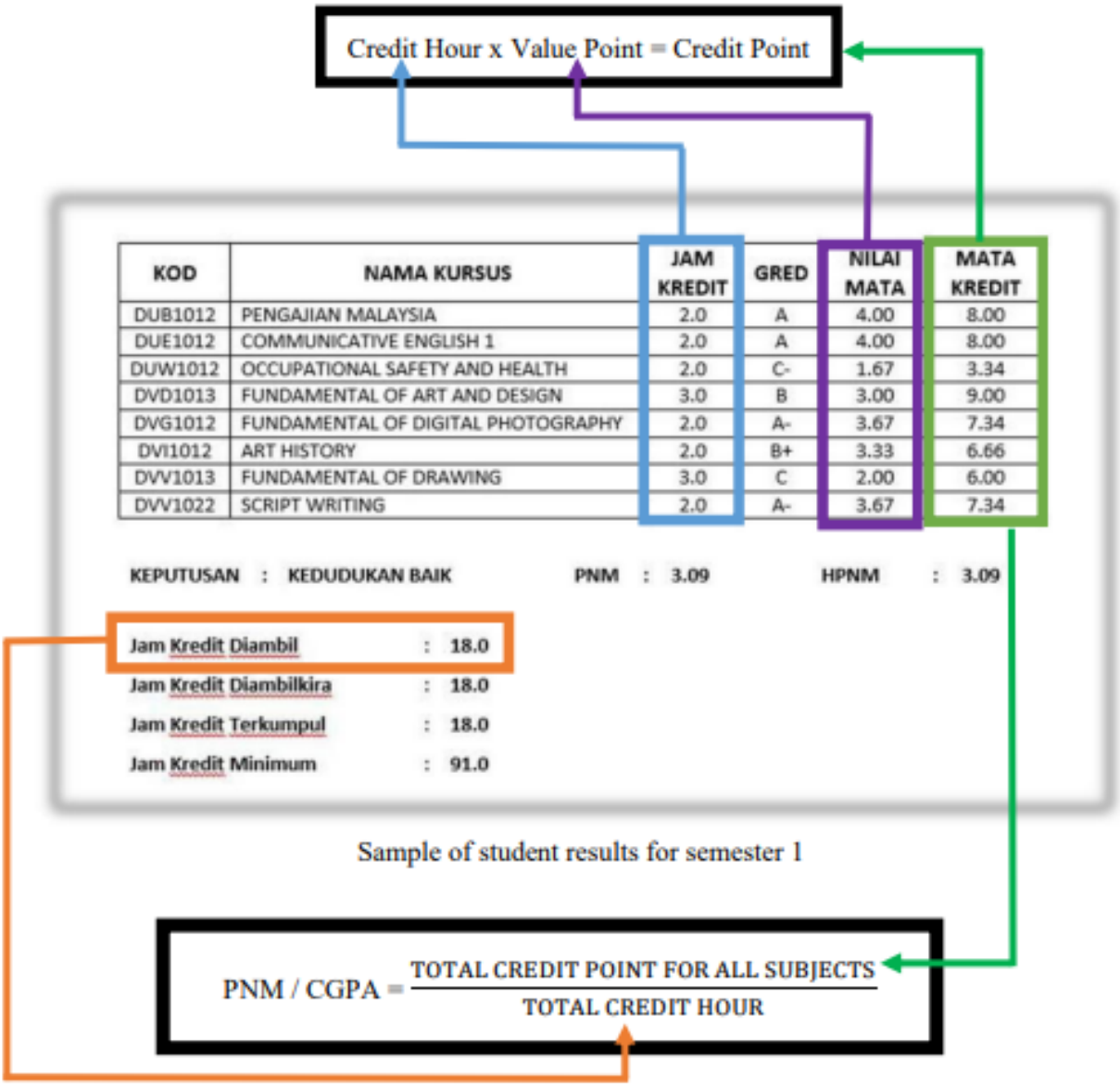
Marks obtained by students in a particular course will be given a grade a respective grade point according to grading scheme

MARKS	GRADE POINT	GRADE	STATUS
90-100	4.00	A+	EXCEPTIONAL
80-89	4.00	A	EXCELLENT
75-79	3.67	A-	DISTINCTION
70-74	3.33	B+	DISTINCTION
65-69	3.00	B	DISTINCTION
60-64	2.67	B-	PASS
55-59	2.33	C+	PASS
50-54	2.00	C	PASS
47-49	1.67	C-	PASS
44-46	1.33	D+	PASS
40-43	1.00	D	PASS
30-39	0.67	E	FAIL
20-29	0.33	E-	FAIL
0-19	0.00	F	FAIL

EXAMINATION



EXAMINATION – HOW TO CALCULATE PNM (GPA)



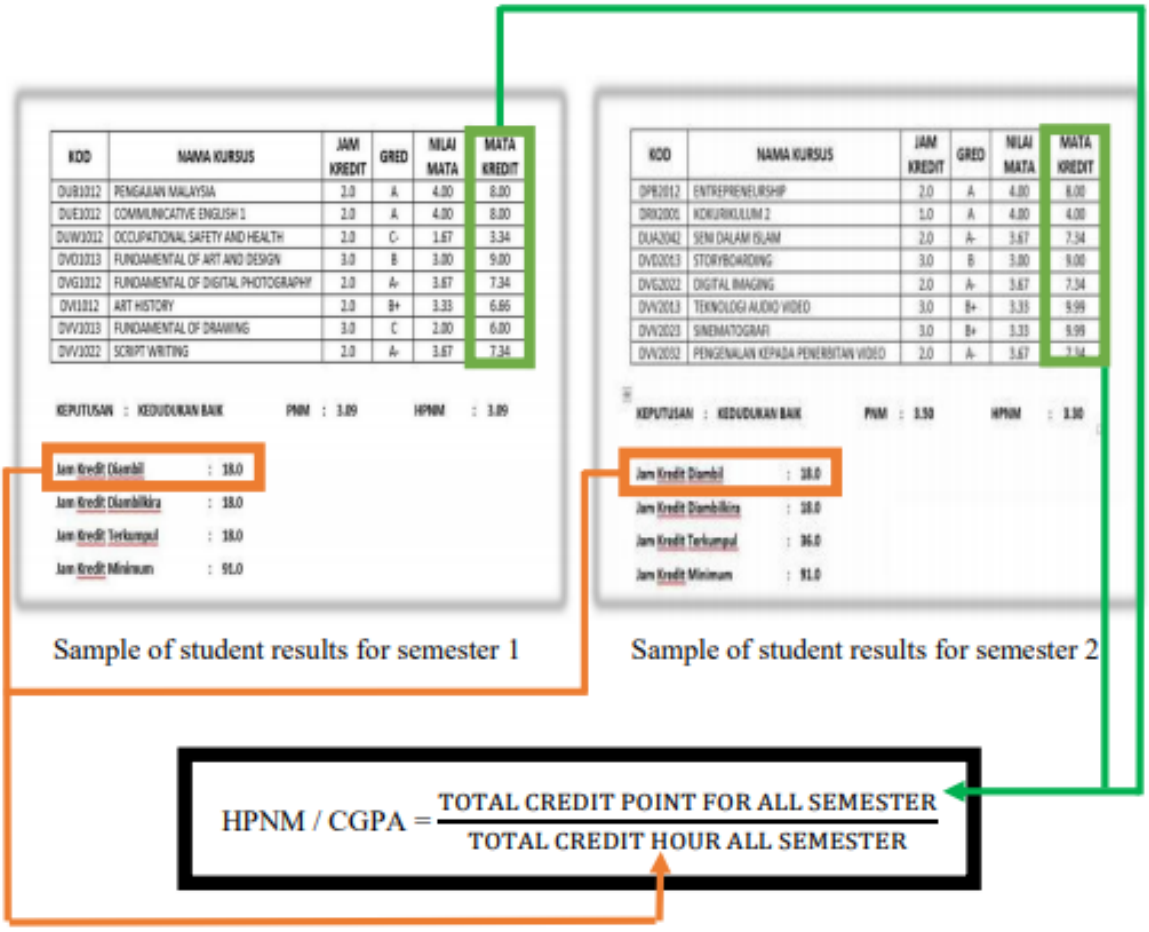
Sample of student results for semester 1

PNM /GPA = (8.00 + 8.00 + 3.34 + 9.00 +7.34 + 6.66 + 6.00 + 7.34)/18

PNM /GPA = 55.68 / 18

PNM /GPA = 3.09

EXAMINATION – HOW TO CALCULATE HPNM (CGPA)



KOD	NAMA KURSUS	JAM KREDIT	GRED	NILAI MATA	MATA KREDIT
DUB1012	PENGAJIAN MALAYSIA	2.0	A	4.00	8.00
DUE1012	COMMUNICATIVE ENGLISH 1	2.0	A	4.00	8.00
DUW1012	OCCUPATIONAL SAFETY AND HEALTH	2.0	C-	1.67	3.34
DVD1013	FUNDAMENTAL OF ART AND DESIGN	3.0	B	3.00	9.00
DVG1012	FUNDAMENTAL OF DIGITAL PHOTOGRAPHY	2.0	A-	3.67	7.34
DVI1012	ART HISTORY	2.0	B+	3.33	6.66
DVV1013	FUNDAMENTAL OF DRAWING	3.0	C	2.00	6.00
DVV1022	SCRIPT WRITING	2.0	A-	3.67	7.34

KEPUTUSAN : KEDUDUKAN BAIK PNM : 3.89 HPNM : 3.89

Jam Kredit Diambil : 18.0
Jam Kredit Diambilkira : 18.0
Jam Kredit Terkumpul : 18.0
Jam Kredit Minimum : 91.0

Sample of student results for semester 1

KOD	NAMA KURSUS	JAM KREDIT	GRED	NILAI MATA	MATA KREDIT
DPB2012	ENTREPRENEURSHIP	2.0	A	4.00	8.00
DRK2005	KOKURIKULUM 2	1.0	A	4.00	4.00
DUA2042	SENI DALAM ISLAM	2.0	A-	3.67	7.34
DVD3013	STORYBOARDING	3.0	B	3.00	9.00
DVG2022	DIGITAL IMAGING	2.0	A-	3.67	7.34
DVV2013	TEKNOLOGI AUDIO VIDEO	3.0	B+	3.33	9.99
DVV2023	SINEMATOGRAFI	3.0	B+	3.33	9.99
DVV2032	PENGENALAN KEPADA PENERBITAN VIDEO	2.0	A-	3.67	7.34

KEPUTUSAN : KEDUDUKAN BAIK PNM : 3.50 HPNM : 3.30

Jam Kredit Diambil : 18.0
Jam Kredit Diambilkira : 18.0
Jam Kredit Terkumpul : 36.0
Jam Kredit Minimum : 91.0

Sample of student results for semester 2

$$\text{HPNM / CGPA} = \frac{\text{TOTAL CREDIT POINT FOR ALL SEMESTER}}{\text{TOTAL CREDIT HOUR ALL SEMESTER}}$$

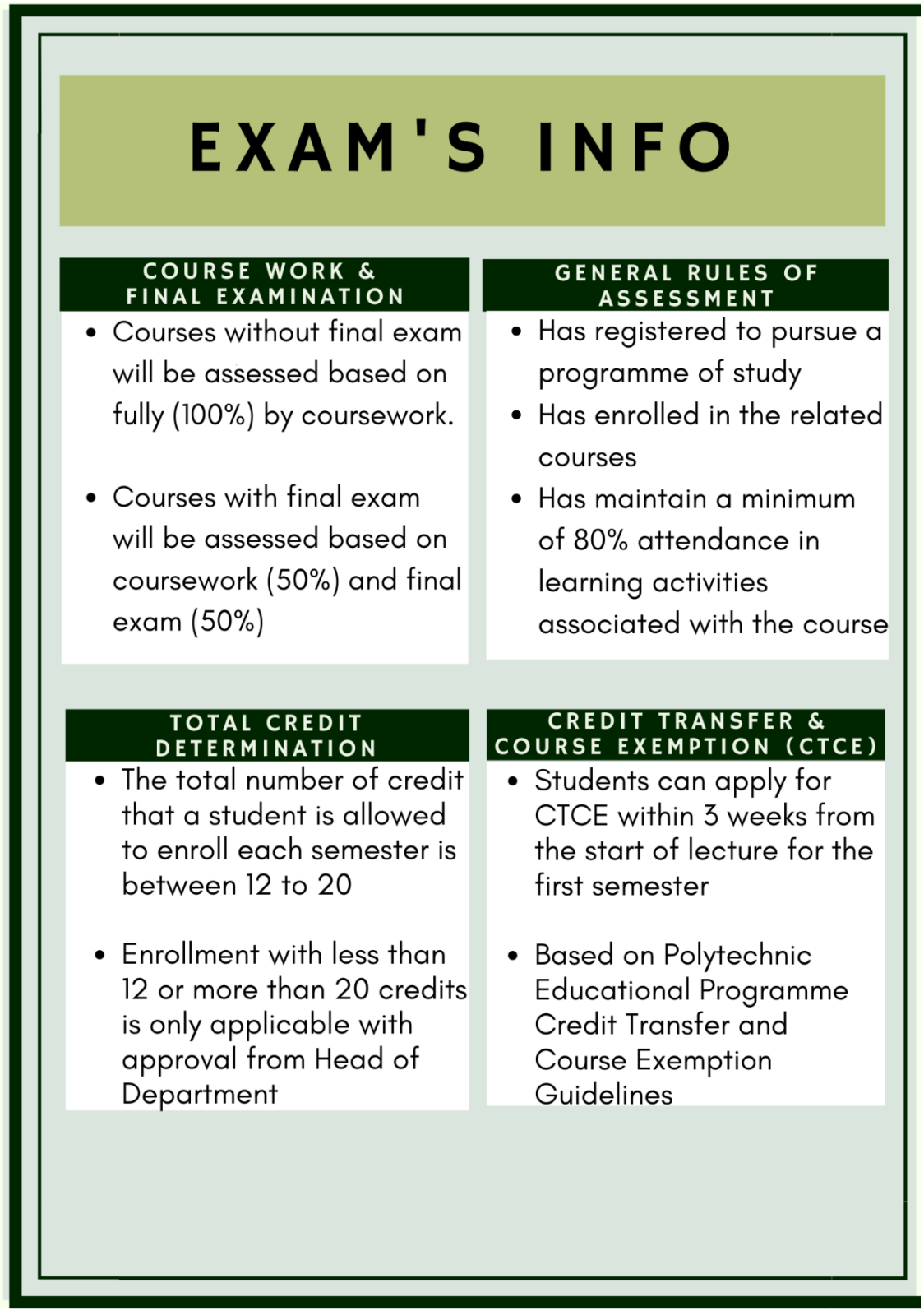
HPNM / CGPA = ((8.00 + 4.00 + 7.34 + 9.00 + 7.34 + 9.99 + 9.99 + 7.34) + 55.68) / (18 + 18)

HPNM / CGPA = (63 + 55.68) / 36

HPNM / CGPA = 118.68 / 36

HPNM / CGPA = 3.30

EXAMINATION



EXAMINATION

COURSE ENROLMENT

- Course enrolment is done at the beginning of each semester within (7) seven days from the official date of the beginning of the academic semester.
- Students must meet the total credits allowed by adding other courses that are on offer in the current semester and repeat modules (carry) from the previous semester.
- Students need to get advice from the Academic Advisor as well as the confirmation of the respective Head of Department before registering.
- Student who has enrolled in a course has a responsibility to follow all learning activities and comply with all the requirements of the course.
- Student must fulfil the minimum attendance percentage as stipulated to be evaluated for all learning activities associated with the registered course.
- Failure of students to attend any learning activity satisfactorily for a module may result in students not being eligible to sit for the examination for that module.

ADDING AND DROPPING A COURSE

- Students who have registered a module can add or drop a course(s) provided that the total number of credits allowed for the particular semester is not less or not more than the set number of credit hours.
- Students are allowed to add or drop a course from the beginning of week three (3) until week (6) of a particular academic semester. Students should first seek advice and endorsement from their Academic Advisor and/ or Head of Academic Programme and approval from the respective Head of Department.
- Students are not allowed to add or drop a course after the specified timeframe.

EXAMINATION

REPEATING A COURSE

- Students who failed compulsory, core courses and discipline core courses in a particular semester should enroll and repeat failed courses from the previous semester.
- Students should undertake all the learning activities associated with the repeated courses.
- Students need to register to repeat the module together with the module set for the current semester after getting advice from the Academic Advisor and the approval of the Head of Department.
- The method of repeating the module is subject to the condition of the maximum total number of credit hours that have been set for each semester.
- The method of repeating the module is also subject to whether the module is offered or not during the semester.

IMPROVING COURSE GRADES

Students who passed with grade C-, D+ or D for any course:

i. is allowed to improve course grade for a particular course once during his/ her duration of study.
ii. should undertake all the learning activities associated with the course during any subsequent semester including short semester.
iii. will have the highest grade earned used to compute the grade point obtained for the particular course.
iv. can enroll to improve the course grade for a particular course but the total number of credits taken should not exceed twenty (20) credits. Under circumstances where this is not possible, student must obtain the approval of the Head of Department.

EXAMINATION

PROGRESSION IN THE PROGRAMME OF STUDIES

Students who obtained good standing (KB) and conditional standing (KS) are eligible to progress to subsequent semester.

CATEGORIES OF ASSESSMENT RESULTS

Assessment result for each semester will be categorized as below:

i. **Full Pass (LP)**
Final semester students who acquire a CGPA that is equal to or more than 2.00, fulfil the required conditions, are qualified to be awarded a certificate.

ii. **Good Standing (KB)**
Students who acquire a CGPA that is equal to or more than 2.00.

iii. **Conditional Standing (KS)**
Students who acquire a CGPA that is equal to or more than 1.60 but less than 2.00.

iv. **Fail and Termination of Study (GB)**
Fail and termination of study status will be given to students who:
a) Attain a CGPA that is less than 1.60
b) Attain a GPA that is less than 1.00
c) Fail a particular course three (3) times, which include the special final examination or special assessment or short semester
d) Attain KS standing three (3) times consecutively
e) Fail Industrial training course TWICE
f) Fail the same WBL course TWICE
g) Have exceeded the maximum duration of study for a particular programme.

EXAMINATION

DURATION OF STUDY

The duration of study for a Diploma course is as follows:

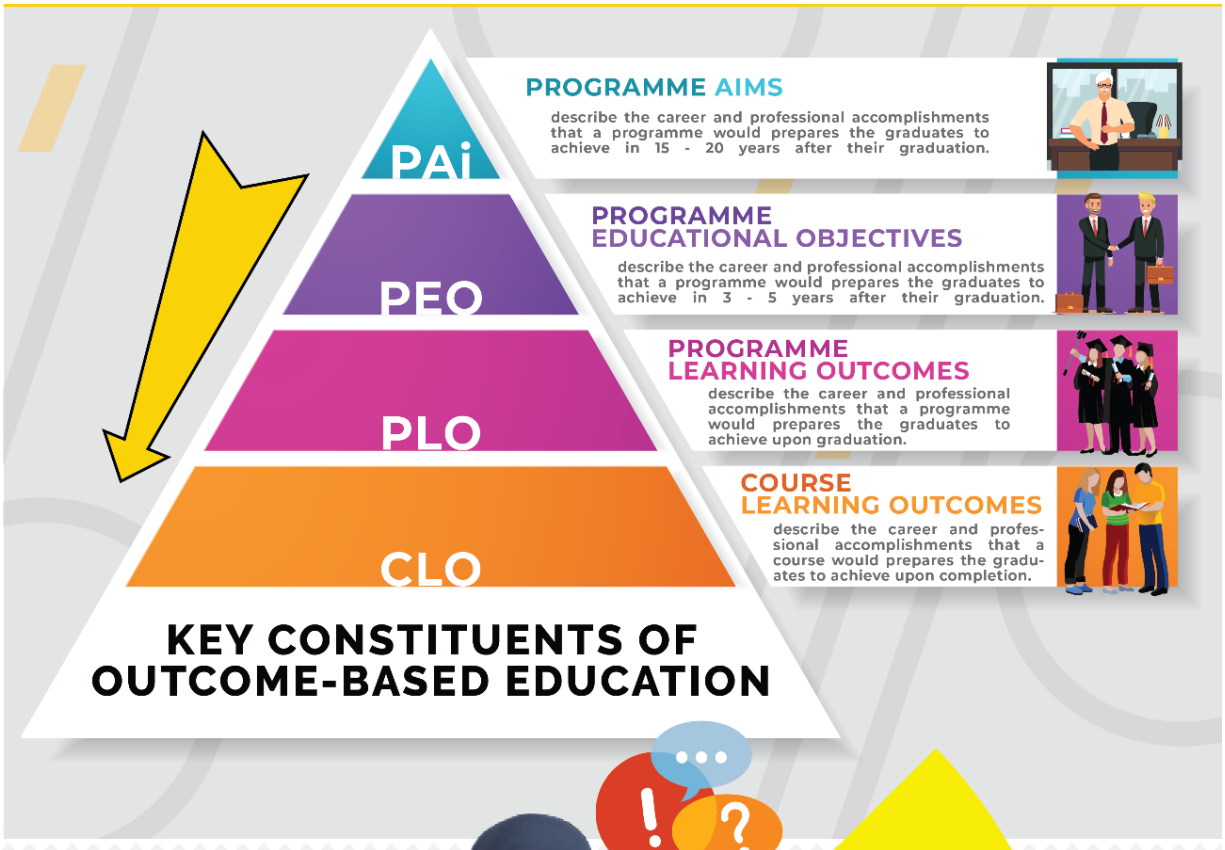
i. Minimum: 5 semesters
ii. Maximum: 9 semesters

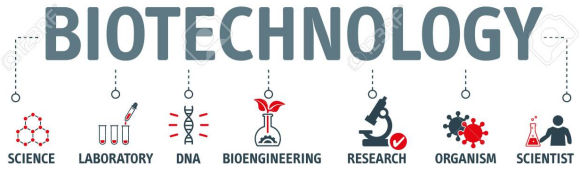
CONFERMENT OF AWARD

Students are deemed to have completed their studies and qualified to be awarded a certificate of a particular programme if they satisfy the following criteria;

i. Pass all required courses for the particular programme
ii. Obtain a CGPA that is equal to or more than 2.00
iii. Acquire the total credit assigned to the particular programme
iv. Endorsed by the Examination Board.

PAi, PEO, PLO AND CLO





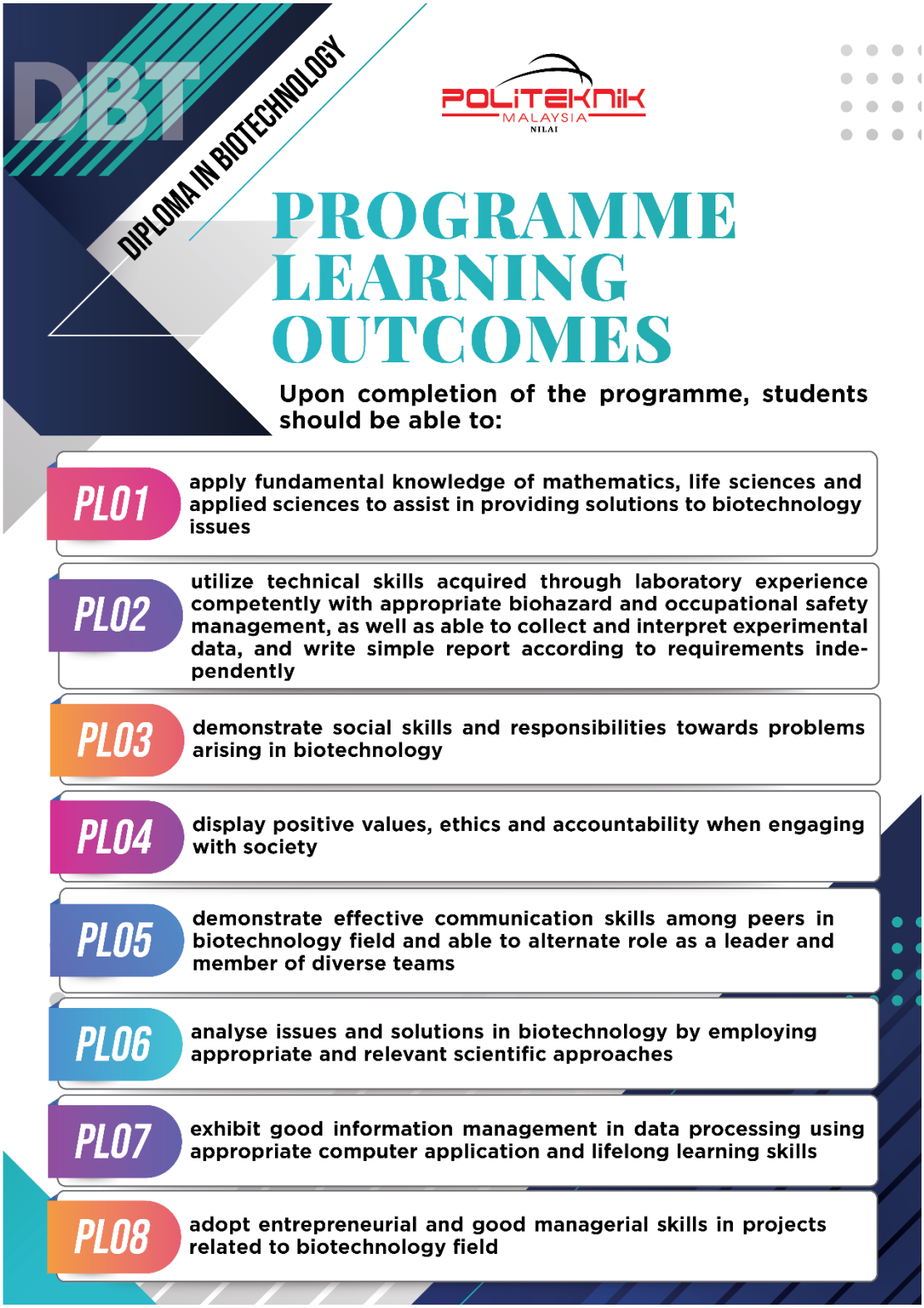
DIPLOMA IN BIOTECHNOLOGY PROGRAM

Biotechnology is the use of living systems and organisms to develop or make products, or "any technological application that uses biological systems, living organisms, or derivatives thereof, to make or modify products or processes for specific use". Semiprofessional capital development in the field of biotechnology is a necessity to ensure the development of bio-based industry. Balanced and enterprising TVET graduates are important to supply workforce for Industry 4.0. The Diploma in Biotechnology is a three-year full-time programme comprising of six semesters including one full semester of industrial training built in. Students are prepared for their future role in the economy by building a solid foundation in technical knowledge and the necessary skills, related to the field of biotechnology.

The Diploma in Biotechnology programme is designed to cover the broad discipline of biotechnology. The broad-based biotechnology foundation which includes application of microbiology in biotechnology, application of biotechnology in industry, plant tissue culture and bioprocess technology that provide versatility to the graduates whilst emphasizing the area of specialization. The knowledge and skills coverage of all fields would provide graduates with a wider range of employment opportunities. Apart from the technical knowledge and skills, the programme also emphasizes on the development of the individual potential of students in an integrated and holistic manner through courses such as Islamic studies, moral studies, co-curriculum, soft skills, and entrepreneurship.

DIPLOMA IN BIOTECHNOLOGY PAi AND PEO

DIPLOMA IN BIOTECHNOLOGY PLO's



PROGRAMME STRUCTURE

Semester	Course Code	Course Name	Classification	Credit	Pre/Co-Requisite
1	MPU21032	Penghayatan Etika dan Peradaban	Compulsory	2	
	DUE10012	Communicative English 1	Compulsory	2	
	MPU24XX1	Sukan	Compulsory	1	
	MPU24XX1	Unit Beruniform 1	Compulsory		
	DYB10013	Biology of Organism	Common Core	3	
	DYB10023	Laboratory Techniques and Management	Common Core	3	
	DYB10033	Chemistry	Common Core	3	
	DYB10042	Introduction to Biotechnology	Discipline Core	2	
			Total	**16**	
2	MPU23052	Sains, Teknologi dan Kejuruteraan Dalam Islam*	Compulsory	2	
	MPU23042	Nilai Masyarakat Malaysia**	Compulsory		
	MPU24XX1	Kelab / Persatuan	Compulsory	1	MPU24XX1
	MPU24XX1	Unit Beruniform 2	Compulsory		
	MPU22012	Entrepreunership	Compulsory	2	
	DYB20054	Physical Organic Chemistry	Common Core	4	
	DYB20063	Biochemistry	Common Core	3	
	DBM10133	Mathematics for Technology	Common Core	3	
	DUW10012	Occupational, Safety and Health	Discipline Core	2	
			Total	**17**	
3	DUE30022	Communicative English 2	Compulsory	2	DUE10012
	DUG30023	Green Technology Compliance	Common Core	3	
	DYB30073	Genetics	Common Core	3	
	DYB30083	Microbiology	Common Core	3	
	DYB30093	Molecular Biology	Common Core	3	
	DYB30103	Biostatistics	Common Core	3	
			Total	**17**	

4	DUE50032	Communicative English 3	Compulsory	2	DUE30022
	DYB40114	Plant Tissue Culture	Discipline Core	4	
	DYB40124	Industrial Biotechnology	Discipline Core	4	
	DYB40132	Bioethics and Biosafety	Discipline Core	2	
	DYB40142	Research Methodology	Discipline Core	2	
		Elective 1	Electives	2	
Total				**16**	
5	DYB50154	Final Project	Discipline Core	4	DYB40142
	DYB50164	Instrumentation in Biotechnology	Discipline Core	4	
	DYB50173	Bioprocess Technology	Discipline Core	3	
	DYB50182	Medical Biotechnology	Discipline Core	2	
		Elective 2	Electives	3	
Total				**16**	
6	DUT60019	Industrial Training	Industrial Training	9	
Total				**9**	
Total Credit Value				**91**	

ELECTIVES COURSES			
1	DYB40192	Agrobiotechnology	2
2	DYB50203	Food Biotechnology	3
3	DYB50213	Environmental Biotechnology	3

FREE ELECTIVES			
1	DUD10012	Design Thinking	2

		Total Credit	**%**
i.	(a) Compulsory	14	15
	(b) Compulsory (Bahasa Kebangsaan A)[b]	2[b]	0
ii.	Common Core	34	37
iii.	Discipline Core	29	32

iv.	Specialization	0	0
	Total Credit	77	
v.	(a) Electives	5	5
	(b) Free Electives[a]	2[a]	0
vi.	Industrial Training	9	10
	Grand Total Credit	91	100

*For Muslim Students

**For Non-Muslim Students

Notes:

1. The minimum and maximum credit value of Electives must be referred to the programme standard or professional bodies.

2. [a]Free Electives are courses which are not included in any programme structure but if taken, will contribute towards students' CGPA, provided that institutions adhere to the Jabatan Pendidikan Politeknik & Kolej Komuniti Free Electives Guidelines.

3. [b]MPU22042 Bahasa Kebangsaan A is **COMPULSORY** for students who did not attain credit in Bahasa Melayu at Sijil Pelajaran Malaysia (SPM) level and will contribute to students' CGPA.

4. Co-curriculum pathways:

a. Path 1 : Sport and Club

b. Path 2 : Uniform Unit (Students are required to PASS Uniform Unit 1 as a prerequisite to Uniform Unit 2)

BIOTECHNOLOGY COURSE SYNOPSIS

COURSE CODE & NAME	SYNOPSIS	CLO
SEMESTER 1		
DYB10013 Biology of Organisms	**BIOLOGY OF ORGANISMS** introduces students to cell as a basic unit of life, aerobic and anaerobic respiration, and the five-kingdom systems: Kingdom Monera, Kingdom Protista, Kingdom Fungi, Kingdom Plantae, and Kingdom Animalia. This course also covers variations, evolution, reproduction and growth of plants and mammals, ecology, biochemical cycle as well as impacts of human activities on biosphere.	**CLO1**: Explain the structure and function of cell, aerobic and anaerobic respiration, reproduction and growth of plants and animal, biological diversity, variation, and evolution as well as the ecology of organisms. **CLO2**: Perform laboratory techniques correctly by observing specimens. **CLO3**: Justify the importance of biodiversity and evolution of life in general
DYB10023 Laboratory Techniques and Management	**LABORATORY TECHNIQUES AND MANAGEMENT** introduces students to safety procedures in laboratory, chemical hazards, industrial safety and health, legislations and laws pertaining to laboratory operation, general analysis, good laboratory practices and first aid knowledge. A series of practical classes is integrated with lectures to further develop concepts covered and to familiarize students with materials and equipment commonly used in laboratories.	**CLO1:** Discuss basic laboratory techniques including various hazards, the importance of first aid, industrial safety issues, as well as the application of Good Laboratory Practices (GLP) **CLO2**: Manage lab equipment and biohazard material in laboratory according to procedure in a team. **CLO3**: Apply ethically and professionally the Good Laboratory Practice (GLP) in laboratory activities
DYB10033 Chemistry	**CHEMISTRY** provides students with theoretical knowledge and laboratory experience in a range of topics in chemistry including the atomic structure, periodic table, chemical bonds, chemical reactions, anion and cation and the behavior of gases. In addition, students will also be introduced to the common concepts and terminologies associated with the field of chemistry.	**CLO1:** Apply the fundamental principles and concepts in chemistry to solve chemical equation and reactions as well as gas law **CLO2**: Follow practical procedures of chemistry laboratory experiments **CLO3**: Demonstrate awareness of balanced chemical reaction through calculation

DYB10042 Introduction to Biotechnology	**INTRODUCTION TO BIOTECHNOLOGY** explores the meaning and origins of biotechnology by looking at the progress and development in the areas of industrial, agriculture and healthcare. Various definitions and developments in biotechnology are discussed to emphasize its impact on modern science and technology. This course also introduces students to a wide-ranging, multi-disciplinary technology of the twenty-first century which includes recombinant DNA techniques and the application of microbiology and cell culture technologies to the production of a wide range of goods	**CLO1:** Explain the development of biotechnology, and the different branches of biotechnology and the applications and contribution of biotechnology in addressing the global issues **CLO2**: Discuss ethical, social and legal issues relation biotechnological scenario in incorporating CDIO approach

COURSE CODE & NAME	SYNOPSIS	CLO
SEMESTER 2		
DYB20054 Physical Organic Chemistry	**PHYSICAL ORGANIC CHEMISTRY** is designed to strengthen the students' basic knowledge in physical chemistry which is widely applicable in life science including identifying acids, bases and buffers, the acid-base reactions, and the oxidation-reduction reactions. It also covers organic chemistry including classification, nomenclature, structures, physical properties, as well as the industrial applications of organic compounds, aromatic compounds, and other homologous series.	**CLO1:** Discuss the basic principles of acids, bases, and buffer solution, the electrochemistry of Galvanic cell, the characteristics and properties as well as the basic concept of organic, aromatic and other homologous series of organic compounds **CLO2**: Follow appropriate practical procedures of laboratory experiments **CLO3**: Participate well as a good follower or leader in team work during lab activities
DYB20063 Biochemistry	**BIOCHEMISTRY** introduces students to the physical and chemical properties, functions, and metabolism of macromolecules such as carbohydrates, proteins, lipids, vitamins, and hormones in living organisms. A series of practical classes is integrated with lectures to allow students to further develop concepts covered in the lectures, and to become familiar with the use of materials and equipment commonly used in biochemistry laboratories.	**CLO1:** Explain the basic knowledge of biological macromolecules, including general formulas, common properties, metabolism and the importance of carbohydrate, lipids and proteins properly as well as the importance of water, vitamins, and hormones essential for growth **CLO2**: Follow appropriate method, techniques and

		biochemical concepts in laboratory procedures **CLO3**: Participate well as a good follower or leader while practicing team work during laboratory activities

COURSE CODE & NAME	SYNOPSIS	CLO
SEMESTER 3		
DYB30073 Genetics	**GENETICS** contains the basic principles of genetics including cell cycle, Mendellian and Non-Mendellian Law, chromosome linkage, genetic mapping, genetic populations and principles of plant and animal breeding.	**CLO1:** Summarize the cell cycle, genetic inheritance and plant and animal breeding as well as solving the problem in genetic inheritance and population genetics **CLO2**: Follow appropriate practical procedure in genetics laboratory experiment **CLO3**: Discuss issues pertaining to genetic inheritance in general
DYB30083 Microbiology	**MICROBIOLOGY** introduces the basics of microbiology, characteristics and classification of microorganisms, ecology of microorganism, cell metabolism, reproduction and growth of microorganisms, cell cultivation and microorganism control. Students will apply safe and correct techniques in staining, cell enumeration, media preparation, isolation, aseptic techniques and cultivation of pure culture	**CLO1:** Explain the characteristics and classification of microorganisms, common properties of every class of microorganisms, the growth and control of microorganisms **CLO2**: Follow practical procedures in microbiology laboratory experiment **CLO3**: Discuss the characteristics and ecology of microorganisms
DYB30093 Molecular Biology	**MOLECULAR BIOLOGY** introduces students to molecular organization of cell, gene transfer mechanism in bacteria, protein synthesis, gene regulation, protein detection techniques, genetic mutations, and the principles of recombinant DNA	**CLO1:** Determine the basic principles in expression, regulation, and isolation of genetic materials through the techniques of recombinant DNA and gene mutation **CLO2**: Follow appropriate practical procedures in cell and molecular biology laboratory experiment **CLO3**: Explain the advancement of molecular biology

DYB30103 Biostatistics	**BIOSTATISTICS** provides both theoretical knowledge and practical examples in the following areas: statistical analyses – probability concepts, parametric hypothesis testing, probability distributions, sampling, regression, and correlation; and quality management, quality assurance and quality control. Statistical tests are carried out, evaluated, and interpreted to maintain quality standards.	**CLO1:** Distinguish appropriately the basic statistical terminologies, types of statistics and their applications as well as solve accurately the statistical problems in life science through calculation **CLO2**: Select appropriate statistical test for data presentation, data description and data analysis by using computer software **CLO3**: Interpret data generated through data analysis

COURSE CODE & NAME	SYNOPSIS	CLO
SEMESTER 4		
DYB40114 Plant Tissue Culture	**PLANT TISSUE CULTURE** introduces students to the structure, growth, and function of plant cells. The course focuses on the technical requirements and media preparations for the culture processes, and discusses various factors affecting the growth of cell and tissue culture. The course also discusses the applications of tissue culture technology in agriculture, and applications of stem cells for agriculture and therapeutic purposes.	**CLO1:** Distinguish general principles, technical requirement, the development and applications of culture processes **CLO2**: Perform media preparation, inoculation and sub-culture techniques aseptically in plant tissue culture laboratory **CLO3**: Recognize scaling up of plant tissue cultures as the potentials to practice entrepreneurship
DYB40124 Industrial Biotechnology	**INDUSTRIAL BIOTECHNOLOGY** introduces students to the important roles of microorganisms in industrial biotechnology. Students will be given an exposure to important aspects in fermentation, bioprocessing and biomanufacturing.	**CLO1:** Analyze basic principles of key enabling technologies in industrial biotechnology involving the production of various biotechnology products and processes and their applications in chemical, food, environmental, pharmaceutical and nutraceutical **CLO2**: Follow appropriate practical procedures in industrial microbiology laboratory experiment **CLO3**: Explain the current application used in industrial biotechnology

DYB40132 Bioethics and Biosafety	**BIOETHICS AND BIOSAFETY** introduces laboratory hazard management and good laboratory practices in biotechnology lab and address the social and ethical issues arise from genetic technologies usage. It also highlights the intellectual property and patenting law in research products.	**CLO1:** Evaluate the importance of bioethics and biosafety in the field of biotechnology **CLO2**: Justify the social and ethical issues in biotechnology
DYB40142 Research Methodology	**RESEARCH METHODOLOGY** is a theoretical and tutorial - based study that guides the students to produce a well written research proposal in the field of biotechnology. It outlines the basic principles involved in the selection and choice of a research topic, the scope of the research, planning the research and research methodology. At the end of the study, a project proposal will be presented for evaluation purposes	**CLO1:** Deconstruct a written proposal comprising research topic, introduction, literature review, research objectives, research questions or hypothesis, research design, research methods, and proposed analysis **CLO2**: Construct a research design based on a selected topic **CLO3**: Defend a research proposal

COURSE CODE & NAME	SYNOPSIS	CLO
SEMESTER 5		
DYB50154 Final Project	**FINAL PROJECT** is a laboratory-based study that requires the student to carry out a research project in the field of biotechnology. It outlines the basic principles involved in the selection and choice of a research topic, the scope of the research, planning and conducting the project. The findings of the study will be written as a report as well as presented for evaluation.	**CLO1:** Apply the concept of biotechnology in conducting a research or case study **CLO2**: Perform the research study based on the research plan from commencement to completion **CLO3**: Organize and present an appropriate costing and project report
DYB50164 Instrumentation in Biotechnology	**INSTRUMENTATION IN BIOTECHNOLOGY** emphasizes the use of instrumentation for chemical analysis. The theory, construction, application, and operation of instrument are discussed. These instruments include spectrophotometry (visible, ultraviolet, near infrared and infrared, emission, absorption), flame photometry, chromatography (gas, liquid, high pressure liquid) and mass spectrometry.	**CLO1:** Explain the function and applications of different instruments in biotechnology **CLO2**: Display appropriate practical skills through group work in instrumentation laboratory experiment **CLO3**: Practice knowledge in data interpretation of instruments used in biotechnology

DYB50173 Bioprocess Technology	**BIOPROCESS TECHNOLOGY** introduces students to the theoretical and practical aspects of bioprocessing. Starting with the kinetics of microbial growth, students will also be given an exposure to the operation of bioreactors and must run a series of experiments involving various types of processes and conditions. Besides that, students will also need to carry out downstream activities of bioprocess production such as extraction and purification	**CLO1:** Explain the development and basic principles in bioprocess technology **CLO2**: Perform bioprocess procedures in line with safety precaution professionally **CLO3**: Practice knowledge in data interpretation based on bioreactor instrument
DYB50182 Medical Biotechnology	**MEDICAL BIOTECHNOLOGY** explores the field of biotechnology and the use of technologies such as genetic engineering, DNA sequencing and tissue culture in the field of medicine. Many of the applications of biotechnology will be discussed with emphasis placed on medical biotechnology applications. Medical biotechnology commodities discussed in this course include molecular diagnostic tools, protein therapeutics production, nucleic acid therapeutic agents and vaccines. Ethical, safety and regulation issues will also be addressed.	**CLO1:** Explore the development and applications of medical biotechnology products in treatment, molecular diagnostics, and prevention of diseases **CLO2**: Justify the importance of ethics and regulations in the process of drug production, genetic testing and new drugs patenting

COURSE CODE & NAME	SYNOPSIS	CLO
ELECTIVES		
DYB40192 Agrobiotechnology	**AGROBIOTECHNOLOGY** introduces the students to the importance of agricultural sector and the breeding programmes in Malaysia. This course focuses on the application of tissue culture, the development of genetically modified organisms (GMO), as well as the importance of detection of contaminants in agricultural produces, alongside with ethical issues and public concerns towards genetically modified organisms and bio-safety regulations.	**CLO1:** Explain the significance of biotechnology in agricultural sector to improve life quality of human-beings and its importance of intellectual property, biosafety regulations, ethical issues, and public concerns on genetically modified organisms (GMO) **CLO2**: Justify bio-ethical issues and increase public concerns over genetic modified organisms (GMO)
DYB50203 Food Biotechnology	**FOOD BIOTECHNOLOGY** explores the field of biotechnology beginning with its origins and the use of genetic engineering techniques. Many of the applications of biotechnology will be	**CLO1:** Discuss the role of biotechnology in the production of certain food commodities, the applications of genetically modified foods, and the ethical

	discussed with emphasis placed on food biotechnology applications. Food commodities discussed in this course include fermentation of dairy products, fish, meat, vegetables, alcohol, acids, flavors, amino acids and enzymes. Ethical, safety and regulation issues will also be addressed.	issues and arising public concerns **CLO2**: Follow appropriate practical procedures in food biotechnology laboratory experiment **CLO3**: Justify the importance of biotechnology approach to achieve food sustainability
DYB50213 Environmental Biotechnology	**ENVIRONMENTAL BIOTECHNOLOGY** emphasizes knowledge and understanding of biotechnology as a tool to protect and conserve the environment. Two important areas of environmental biotechnology (waste treatment and bioenergy production) are also covered.	**CLO1:** Explain the importance of environmental biotechnology and its applications in protecting the environment **CLO2**: Follow appropriate practical procedures in environmental biotechnology laboratory experiment **CLO3**: Justify the importance of biotechnology approach to achieve environmental sustainability

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