

الجامعة الأهلية
AHLIA UNIVERSITY
BAHRAIN

COURSE DIRECTORY

COLLEGE OF ENGINEERING

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COLLEGE OF
ENGINEERING



COLLEGE OF ENGINEERING

Welcome to the College of Engineering at Ahlia University, where education and research are delivered in high standard nationwide. The College of Engineering is considered the main key driver for future sustainable development all over the world. The goal of the College is to promote a confident and healthy learning environment that accepts students with diverse multicultural backgrounds, to produce qualified graduates, with right skills and adequate talents, ready to engage in different engineering disciplines such as computer communications, networks, electronics, hardware and software design, information technology, and much more.

The College of Engineering at Ahlia University is the appropriate choice for students who are looking for an exciting and rewarding career. The quality of the College programmes and graduates reflect our relentless determination to deliver up-to-date courses that are responsive to the rapid changes in the engineering sectors and employer's and societal needs. The College of Engineering offers four-year bachelor's degrees Programmes: Bachelor's Degree in Computer and Communication Engineering (BSCCE) and Bachelor's Degree in Mobile and Network Engineering (BSMNE). Our Programmes have maintained high quality standards and sustained their quality by obtaining full confidence status by the Education and Training Quality Authority (BQA), Kingdom of Bahrain, and have been placed on National Qualifications Framework at level 8.

The College is keen to attract international outstanding faculty members with cutting edge research, willingness to share their knowledge, extensive experience, and remarkable innovations, in addition to talented and highly skilled graduates who work as teaching assistants offers opportunities for outstanding Bahraini members to peruse their postgraduate studies at affiliated international universities. Teaching and learning resources include labs equipped with the latest technology and state-of-the-art equipment.

The College of Engineering provides the students with world-class education and hands-on experience through lectures, research work, internships, student club activities, field trips, and local and regional competitions to enable them to become critical thinkers and skilled doers. Our approach reflects the educational needs of the current age of information technology, with a commitment to life-long learning, enhancement of the graduate's ability to work in multidisciplinary settings, integration of research and practice, teaching, coaching and learning excellence, and an appreciation of creativity and innovation.

Our vision is:

To be internationally recognised as a leading provider of engineering education and research, through distinctive programmes that produce globally competitive engineering professionals.

Our mission is:

To provide high-quality programmes that foster creativity, innovation, and life-long learning skills, in a collegial and dynamic learning environment that empowers learners to achieve their full potential.

Our goals are to:

- Develop and offer academic provision that encourages research and scholarship.
- Provide a depth and breadth of knowledge of the discipline, and nurture talent and creativity.
- Promote critical thinking skills, experimentation skills, and problem-solving skills that can be applied to real world problems.
- Encourage life-long learning, professional responsibility, and global citizenship
- Foster relationships with government, industry, and the wider community.

Overview:

The Computer and Communications Engineering programme focuses on computer and communication engineering concepts and applications. The programme provides exposure to diverse cutting edge technologies spanning computer architecture, microprocessors, embedded systems, digital signal processing and modern digital and analogue communication systems.

The Computer and Communication Engineering undergraduate programme is under the Computer Engineering Department which has a highly qualified and diverse team of academic staff that provides students with inspiration and quality education in the theory and practice of computer and communication systems. The Computer Engineering Department has computer engineering labs equipped with the latest tools and technology to build creativity and inspire innovation for BSCCE students.

The Computer and Communication Engineering undergraduate programme is lined with the ABET accreditation to provide assurance that our programme meets the quality standards of the profession and give the BSCCE graduates an international accreditation for the national, GCC and international job market.

Programme Facts:

- The programme is of 4 years duration
- The programme is taught in English Language
- The programme consists of 134 credit hours covering 45 courses
- The programme is accredited by Higher Education Council.
- The programme achieved "Confidence" in (2016) by the Education and Training Quality Authority.
- The programme is National Qualifications Framework (NQF) placed in (2018) Reference Q17-034 Level 8.
- The programme offers a great opportunity for self-development through internship.

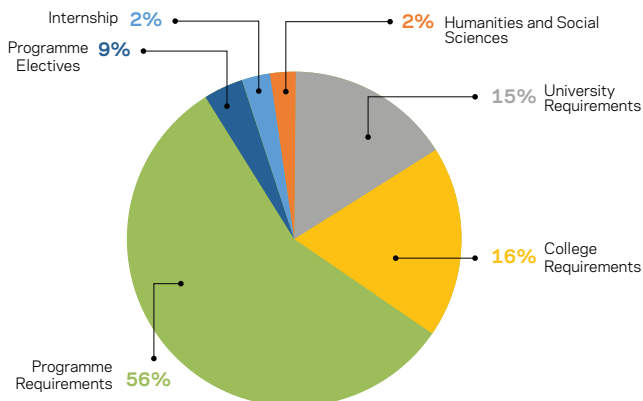
Programme Aims:

The programme aims to:

- To equip learners with in-depth knowledge and skills necessary to exhibit sustainable competence in the fields of computer and communication engineering in accordance with national and international standards.
- To enable learners to identify and solve multifaceted problems in their area of specialization with a view to designing, analyzing, implementing and managing efficient solutions germane to current Engineering technologies.
- To empower learners to successfully pursue careers as computer and communication engineers motivated to engage in research and life-long learning in ways that serve the societal needs.
- To instill in learners, who contribute productively to society through responsible professional engineering practice, norms of ethical behavior.

PROGRAMME COMPONENTS

COURSE TYPE	NO. OF CREDIT-HOURS	NO. OF COURSES
UNIVERSITY REQUIREMENTS	20	7
COLLEGE REQUIREMENTS	21	7
PROGRAMME REQUIREMENTS	75	25
PROGRAMME ELECTIVES	12	4
INTERNSHIP	3	1
HUMANITIES AND SOCIAL SCIENCES	3	1
TOTAL	134	45



LIST OF COURSES

UNIVERSITY REQUIREMENTS

COURSE	CODE	COURSE TITLE	NO. OF CREDIT-HOURS
ARAB	101	COMPOSITION FOR NATIVE SPEAKERS OF ARABIC 1	3
ENGL	101	ACADEMIC ENGLISH I	3
ITCS	101	INTRODUCTION TO COMPUTERS & IT	3
ENGL	102	ACADEMIC ENGLISH II	3
HUMR	101	PRINCIPLES OF HUMAN RIGHTS	2
HIST	121	MODERN HISTORY OF BAHRAIN	3
STAT	101	INTRODUCTION TO STATISTICS	3
TOTAL	7 COURSES		20 CREDIT-HOURS

COLLEGE REQUIREMENTS

COURSE	CODE	COURSE TITLE	NO. OF CREDIT-HOURS
ENGL	201	ACADEMIC ENGLISH III	3
ENGL	210	TECHNICAL WRITING REPORT	3
ITCS	122	INTRODUCTION TO PROGRAMMING TECHNIQUES	3
MATH	101	CALCULUS I	3
MATH	102	CALCULUS II	3
PHYS	101	GENERAL PHYSICS I	3
PHYS	102	PHYSICS II	3
TOTAL		7 COURSES	21 CREDIT-HOURS

PROGRAMME REQUIREMENTS

COURSE	CODE	COURSE TITLE	NO. OF CREDIT-HOURS
ECCE	201	ELECTRIC CIRCUITS	3
ITCS	209	DISCRETE STRUCTURE	3
MATH	205	DIFFERENTIAL EQUATIONS	3
ITCS	201	OBJECT-ORIENTED PROGRAMMING I	3
ECCE	221	ELECTRONIC CIRCUITS	3
ITCS	224	DATA STRUCTURES	3
ECCE	203	DIGITAL LOGIC	3
ECTE	224	SIGNALS & SYSTEMS	3
MATH	223	LINEAR ALGEBRA AND COMPLEX	3
ECCE	303	COMPUTER ARCHITECTURE AND ORGANIZATION	3
ECTE	314	COMMUNICATION SYSTEMS I	3
ECCE	326	DIGITAL LOGIC DESIGN	3
ECTE	329	COMPUTER NETWORKS	3
ECCE	323	MICROPROCESSORS	3
ETHC	392	ETHICS AND PROFESSIONAL PRACTICE IN IT AND ENGINEERING	3
ECTE	324	COMMUNICATION SYSTEMS II	3
STAT	302	APPLIED PROBABILITY	3
ECTE	322	ANTENNA AND WAVE PROPAGATION	3
ECCE	403	EMBEDDED SYSTEMS	3
ECTE	450	DIGITAL SIGNAL PROCESSING	3
IERM	498	RESEARCH METHODS IN INFORMATION TECHNOLOGY & ENGINEERING	3
ITCS	409	OPERATING SYSTEMS	3
ECCE	499	MAJOR PROJECT	3
ECTE	424	WIRELESS COMMUNICATIONS	3
TOTAL		25 COURSES	72 CREDIT-HOURS

INTERNSHIP

COURSE	CODE	COURSE TITLE	NO. OF CREDIT-HOURS
INTR	461	BSCCE INTERNSHIP	3
TOTAL		1 COURSE	3 CREDIT-HOURS

HUMANITIES AND SOCIAL SCIENCES

COURSE	CODE	COURSE TITLE	NO. OF CREDIT-HOURS
ANTH	101	INTRODUCTION TO ANTHROPOLOGY	3
ARAB	102	COMPOSITION FOR NATIVE SPEAKERS OF ARABIC II	3
ARAB	201	INTRODUCTION TO MODERN ARABIC LITERATURE	3
CHIN	101	INTRODUCTION TO CHINESE I	3
CULT	101	INTRODUCTION TO CULTURE	3
CULT	102	ISLAMIC CULTURE	3
ENGL	215	READINGS IN ENGLISH LITERATURE I	3
ENGL	216	READINGS IN ENGLISH LITERATURE II	3
ENGL	221	INTRODUCTION TO TRANSLATION	3
ENGL	218	WORKPLACE WRITING SKILLS	3
ETHC	391	ETHICS AND PROFESSIONAL PRACTICE IN BUSINESS	3
ETHC	392	ETHICS AND PROFESSIONAL PRACTICE IN IT AND ENGINEERING	3
ETHC	393	ETHICS AND PROFESSIONAL PRACTICE IN MASS COMMUNICATION AND PUBLIC RELATIONS	3
ETHC	394	ETHICS AND PROFESSIONAL PRACTICE IN INTERIOR DESIGN	3
FREN	101	FRENCH I	3
FREN	102	FRENCH II	3
GERM	101	GERMAN LANGUAGE & CULTURE I	3
GERM	102	GERMAN LANGUAGE & CULTURE II	3
HIST	101	MODERN HISTORY OF THE MIDDLE EAST & NORTH AFRICA	3
IREL	101	INTERNATIONAL RELATIONS	3
KORN	101	INTRODUCTION TO KOREAN LANGUAGE I	3
KORN	102	INTRODUCTION TO KOREAN LANGUAGE II	3
LAW	101	INTRODUCTION TO LEGAL SYSTEMS & LEGAL REASONING	3
PSYC	101	INTRODUCTION TO PSYCHOLOGY	3
SOCI	101	SOCIOLOGY	3
SOCI	102	SOCIOLOGY II	3
SPAN	101	INTRODUCTION TO SPANISH I	3
SPAN	102	INTRODUCTION TO SPANISH II	3
TOTAL		ANY ONE OF THE ABOVE COURSES	3 CREDIT-HOURS

MAJOR ELECTIVE

STUDENT CAN TAKE ANY FOUR COURSES (12 CREDIT-HOURS) AS MAJOR ELECTIVE

DETAILED STUDY PLAN (BSCCE)

FIRST YEAR (35 CREDITS)

FIRST SEMESTER

COURSE	CODE	COURSE TITLE	LEC.	LAB	CRE.	PREREQUISITE
ARAB	101	COMPOSITION FOR NATIVE SPEAKERS OF ARABIC I	3	0	3	
ENGL	101	ACADEMIC ENGLISH I	3	0	3	(ENGL 052 AND ENGL 055) OR PASSING PLACEMENT TEST
ITCS	101	INTRODUCTION TO COMPUTERS & IT	2	2	3	
MATH	101	CALCULUS I	3	0	3	MATH 053 OR PASSING PLACEMENT TEST
PHYS	101	GENERAL PHYSICS I	3	0	3	MATH 053 OR PASSING PLACEMENT TEST
STAT	101	INTRODUCTION TO STATISTICS	3	0	3	MATH 053 OR PASSING PLACEMENT TEST

TOTAL PER SEMESTER

18

SECOND SEMESTER

COURSE	CODE	COURSE TITLE	LEC.	LAB	CRE.	PREREQUISITE
ENGL	102	ACADEMIC ENGLISH II	3	0	3	ENGL 101
HIST	121	MODERN HISTORY OF BAHRAIN	3	0	3	
ITCS	122	INTRODUCTION TO PROGRAMMING TECHNIQUES	2	2	3	ITCS 101
MATH	102	CALCULUS II	3	0	3	MATH 101
PHYS	102	PHYSICS II	2	2	3	PHYS 101
HUMR	101	PRINCIPLES OF HUMAN RIGHTS	2	0	2	

TOTAL PER SEMESTER

17

SECOND YEAR (33 CREDITS)

FIRST SEMESTER

COURSE	CODE	COURSE TITLE	LEC.	LAB	CRE.	PREREQUISITE
ECCE	201	ELECTRIC CIRCUITS	2	2	3	PHYS 102 & MATH 102
ITCS	209	DISCRETE STRUCTURES	3	0	3	MATH 101
MATH	205	DIFFERENTIAL EQUATIONS	3	0	3	MATH 102
ITCS	201	OBJECT-ORIENTED PROGRAMMING I	2	2	3	ITCS 122
ENGL	201	ACADEMIC ENGLISH III	3	0	3	ENGL 102

TOTAL PER SEMESTER

15

SECOND SEMESTER

COURSE	CODE	COURSE TITLE	LEC.	LAB	CRE.	PREREQUISITE
ECCE	221	ELECTRONIC CIRCUITS	2	2	3	ECCE 201
ITCS	224	DATA STRUCTURES	2	2	3	ITCS 201
ECCE	203	DIGITAL LOGIC	2	2	3	ITCS 101
ECTE	224	SIGNALS & SYSTEMS	2	2	3	MATH 205
MATH	223	LINEAR ALGEBRA & COMPLEX ANALYSIS	3	0	3	MATH 101
ENGL	210	TECHNICAL REPORT WRITING	3	0	3	ENGL 201
TOTAL PER SEMESTER					18	

THIRD YEAR (36 CREDITS)

FIRST SEMESTER

COURSE	CODE	COURSE TITLE	LEC.	LAB	CRE.	PREREQUISITE
ECCE	303	COMPUTER ARCHITECTURE AND ORGANIZATION	2	2	3	ECCE 203
ITCS	323	DATABASE SYSTEMS: DESIGN AND APPLICATION	2	2	3	ITCS 224
ECTE	314	COMMUNICATION SYSTEMS I	2	2	3	ECTE 224 & ECCE 221
ECCE	326	DIGITAL LOGIC DESIGN	2	2	3	ECCE 203
ECTE	329	COMPUTER NETWORKS	2	2	3	ECCE 203
TOTAL PER SEMESTER					15	

SECOND SEMESTER

COURSE	CODE	COURSE TITLE	LEC.	LAB	CRE.	PREREQUISITE
ECCE	323	MICROPROCESSORS	2	2	3	ECCE 303
HU/SS	XXX	HUMANITIES/ SOCIAL SCIENCES	3	0	3	
ETHC	392	ETHICS AND PROFESSIONAL PRACTICE IN IT AND ENGINEERING	3	0	3	COMPLETION OF AT LEAST 66 CREDITS
ECTE	324	COMMUNICATION SYSTEMS II	2	2	3	ECTE 314
STAT	302	APPLIED PROBABILITY	3	0	3	STAT 101 & MATH 102
ECTE	322	ANTENNA AND WAVE PROPAGATION	2	2	3	MATH 205 & MATH 223
TOTAL PER SEMESTER					18	

SUMMER SEMESTER

COURSE	CODE	COURSE TITLE	LEC.	LAB	CRE.	PREREQUISITE
INTR	461	BSCCE INTERNSHIP	0	0	3	COMPLETION OF AT LEAST 90 CREDITS AND MINIMUM CGPA 2
TOTAL PER SEMESTER					3	

FOURTH YEAR (30 CREDITS)

FIRST SEMESTER

COURSE	CODE	COURSE TITLE	LEC.	LAB	CRE.	PREREQUISITE
ECCE	403	EMBEDDED SYSTEMS	2	2	3	ECCE 323
ECTE	450	DIGITAL SIGNAL PROCESSING	2	2	3	ECTE 224
IERM	498	RESEARCH METHODS IN INFORMATION TECHNOLOGY & ENGINEERING	3	0	3	COMPLETION OF AT LEAST 90 CREDITS
XXXX	XXX	MAJOR ELECTIVE I	X	X	3	
XXXX	XXX	MAJOR ELECTIVE II	X	X	3	
TOTAL PER SEMESTER					15	

SECOND SEMESTER

COURSE	CODE	COURSE TITLE	LEC.	LAB	CRE.	PREREQUISITE
ITCS	409	OPERATING SYSTEMS	3	0	3	ECCE 303
ECCE	499*	MAJOR PROJECT	0	6	3	IERM 498 & ETHC 392
ECTE	424	WIRELESS COMMUNICATIONS	2	2	3	ECTE 324 & ECTE 322
XXXX	XXX	MAJOR ELECTIVE III	X	X	3	
XXXX	XXX	MAJOR ELECTIVE IV	X	X	3	
TOTAL PER SEMESTER					15	

*EQUIVALENT TO 6 PRACTICAL HOURS

PROGRAMME ELECTIVE

COURSE	CODE	COURSE TITLE	LEC.	LAB	CRE.	PREREQUISITE
ECTE	474	OPTICAL COMMUNICATIONS	2	2	3	ECTE 324
ECCE	451	MACHINE LEARNING	2	2	3	STAT 302 & MATH 205
ECCE	452	COMPUTER VISION	2	2	3	ITCS 224
ECCE	324	PRINCIPLES OF CONTROL SYSTEMS	2	2	3	ECTE 224 & MATH 205
ECTE	406	MULTIMEDIA COMMUNICATIONS	2	2	3	ECTE 450
ECCE	425	ENGINEERING MANAGEMENT	3	0	3	COMPLETION OF 90 CREDITS
ECCE	413	INTERNET OF THINGS	2	2	3	ECCE 303 & ECTE 329
ECCE	424	CYBER SECURITY	2	2	3	STAT 302
ITMS	437	CLOUD SERVICES DEVELOPMENT	2	2	3	ITCS 323
ECCE	443	APPLIED ROBOTICS	2	2	3	ECCE 323

Overview:

The Bachelor's Degree programme in Mobile and Network Engineering (BSMNE) is a broad-based programme that provides the students with the technical knowledge and skills required to plan, design, construct and maintain telecommunications networks, equipment and facilities. This programme emphasizes an in-depth understanding of the technologies that support the local and global broadband digital networking and mobile communication systems that are required for tomorrow's broadband-interactive information transmission.

Through this programme, students acquire in-depth knowledge in wireless and mobile communications, Computer networks, network design, Network switching and routing, mobile device programming, modern digital and analogue communication systems, and multimedia service convergences ensuring that graduates are fully prepared for employment within the sector. The several network courses embedded within the curriculum prepare students for professional certifications such as Cisco, CCNA and CCNP.

The programme has been recently updated to meet ABET accreditation requirements in terms of well-balanced curricula providing breadth and depth in both theory and practice of mobile and network engineering disciplines.

Programme Facts:

- The programme is run over 4 years
- The programme is taught in English Language
- The programme consists of 134 credit hours covering 45 courses
- The programme is accredited by Higher Education Council.
- The programme achieved "Confidence" in (2016) by The Education and Training Quality Authority.
- The programme is National Qualifications Framework (NQF) placed in (2018) Reference Q17-035 Level 8.
- The programme offers a great opportunity for self-development through internship.

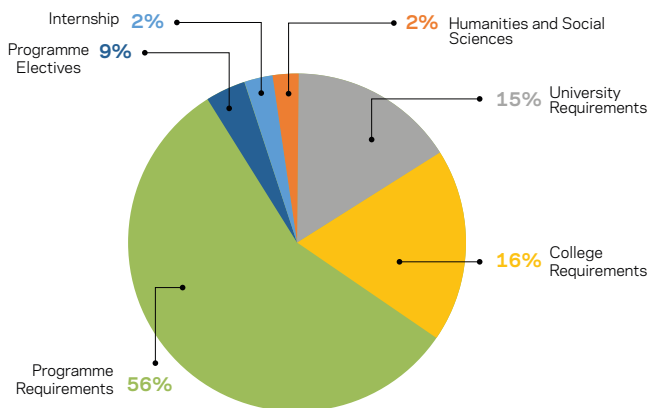
Programme Aims:

The programme aims to:

- To equip learners with in-depth knowledge and skills necessary to exhibit sustainable competence in the fields of mobile and network engineering in accordance with national and international standards.
- To enable learners to identify and solve multifaceted problems in their area of specialization with a view to designing, analyzing, implementing and managing efficient solutions germane to current Engineering technologies.
- To empower learners to successfully pursue careers as mobile and network engineers motivated to engage in research and life-long learning in ways that serve the societal needs.
- To instill in learners, who contribute productively to society through responsible professional engineering practice, norms of ethical behavior.

PROGRAMME COMPONENTS

COURSE TYPE	NO. OF CREDIT-HOURS	NO. OF COURSES
UNIVERSITY REQUIREMENTS	20	7
COLLEGE REQUIREMENTS	21	7
PROGRAMME REQUIREMENTS	75	25
PROGRAMME ELECTIVES	12	4
INTERNSHIP	3	1
HUMANITIES AND SOCIAL SCIENCES	3	1
TOTAL	134	45



LIST OF COURSES

UNIVERSITY REQUIREMENTS

COURSE	CODE	COURSE TITLE	NO. OF CREDIT-HOURS
ARAB	101	COMPOSITION FOR NATIVE SPEAKERS OF ARABIC 1	3
ENGL	101	ACADEMIC ENGLISH I	3
ITCS	101	INTRODUCTION TO COMPUTERS & IT	3
ENGL	102	ACADEMIC ENGLISH II	3
HUMR	101	PRINCIPLES OF HUMAN RIGHTS	2
HIST	121	MODERN HISTORY OF BAHRAIN	3
STAT	101	INTRODUCTION TO STATISTICS	3
TOTAL	7 COURSES		20 CREDIT-HOURS

COLLEGE REQUIREMENTS

COURSE	CODE	COURSE TITLE	NO. OF CREDIT-HOURS
ENGL	201	ACADEMIC ENGLISH III	3
ENGL	210	TECHNICAL WRITING REPORT	3
ITCS	122	INTRODUCTION TO PROGRAMMING TECHNIQUES	3
MATH	101	CALCULUS I	3
MATH	102	CALCULUS II	3
PHYS	101	GENERAL PHYSICS I	3
PHYS	102	PHYSICS II	3
TOTAL		7 COURSES	21 CREDIT-HOURS

PROGRAMME REQUIREMENTS

COURSE	CODE	COURSE TITLE	NO. OF CREDIT-HOURS
ECCE	201	ELECTRIC CIRCUITS	3
ITCS	209	DISCRETE STRUCTURE	3
MATH	205	DIFFERENTIAL EQUATIONS	3
ITCS	201	OBJECT-ORIENTED PROGRAMMING I	3
ECCE	221	ELECTRONIC CIRCUITS	3
ITCS	224	DATA STRUCTURES	3
ECTE	224	SIGNALS & SYSTEMS	3
ECCE	203	DIGITAL LOGIC	3
MATH	223	LINEAR ALGEBRA AND COMPLEX	3
ECCE	303	COMPUTER ARCHITECTURE AND ORGANIZATION	3
ECTE	314	COMMUNICATION SYSTEMS I	3
ECTE	329	COMPUTER NETWORKS	3
ECTE	324	COMMUNICATION SYSTEMS II	3
ECTE	349	NETWORK ROUTING & SWITCHING	3
ECTE	328	MOBILE APPLICATION DEVELOPMENT	3
STAT	302	APPLIED PROBABILITY	3
ETHC	392	ETHICS AND PROFESSIONAL PRACTICE IN IT AND ENGINEERING	3
ECTE	322	ANTENNA AND WAVE PROPAGATION	3
IERM	498	RESEARCH METHODS IN INFORMATION TECHNOLOGY & ENGINEERING	3
ECTE	450	DIGITAL SIGNAL PROCESSING	3
ECTE	421	NETWORK DESIGN & SECURITY	3
ECTE	424	WIRELESS COMMUNICATIONS	3
ECTE	499	MAJOR PROJECT	3
TOTAL		23 COURSES	69 CREDIT-HOURS

INTERNSHIP

COURSE	CODE	COURSE TITLE	NO. OF CREDIT-HOURS
INTR	462	BSMNE INTERNSHIP	3
TOTAL		1 COURSE	3 CREDIT-HOURS

HUMANITIES AND SOCIAL SCIENCES

COURSE	CODE	COURSE TITLE	NO. OF CREDIT-HOURS
ANTH	101	INTRODUCTION TO ANTHROPOLOGY	3
ARAB	102	COMPOSITION FOR NATIVE SPEAKERS OF ARABIC II	3
ARAB	201	INTRODUCTION TO MODERN ARABIC LITERATURE	3
CHIN	101	INTRODUCTION TO CHINESE I	3
CULT	101	INTRODUCTION TO CULTURE	3
CULT	102	ISLAMIC CULTURE	3
ENGL	215	READINGS IN ENGLISH LITERATURE I	3
ENGL	216	READINGS IN ENGLISH LITERATURE II	3
ENGL	221	INTRODUCTION TO TRANSLATION	3
ENGL	218	WORKPLACE WRITING SKILLS	3
ETHC	391	ETHICS AND PROFESSIONAL PRACTICE IN BUSINESS	3
ETHC	392	ETHICS AND PROFESSIONAL PRACTICE IN IT AND ENGINEERING	3
ETHC	393	ETHICS AND PROFESSIONAL PRACTICE IN MASS COMMUNICATION AND PUBLIC RELATIONS	3
ETHC	394	ETHICS AND PROFESSIONAL PRACTICE IN INTERIOR DESIGN	3
FREN	101	FRENCH I	3
FREN	102	FRENCH II	3
GERM	101	GERMAN LANGUAGE & CULTURE I	3
GERM	102	GERMAN LANGUAGE & CULTURE II	3
HIST	101	MODERN HISTORY OF THE MIDDLE EAST & NORTH AFRICA	3
IREL	101	INTERNATIONAL RELATIONS	3
KORN	101	INTRODUCTION TO KOREAN LANGUAGE I	3
KORN	102	INTRODUCTION TO KOREAN LANGUAGE II	3
LAW	101	INTRODUCTION TO LEGAL SYSTEMS & LEGAL REASONING	3
PSYC	101	INTRODUCTION TO PSYCHOLOGY	3
SOCI	101	SOCIOLOGY	3
SOCI	102	SOCIOLOGY II	3
SPAN	101	INTRODUCTION TO SPANISH I	3
SPAN	102	INTRODUCTION TO SPANISH II	3
TOTAL		ANY ONE OF THE ABOVE COURSES	3 CREDIT-HOURS

MAJOR ELECTIVE

STUDENT CAN TAKE ANY FOUR COURSES (12 CREDIT-HOURS) AS MAJOR ELECTIVE

DETAILED STUDY PLAN (BSMNE)

FIRST YEAR (35 CREDITS)

FIRST SEMESTER

COURSE	CODE	COURSE TITLE	LEC.	LAB	CRE.	PREREQUISITE
ARAB	101	COMPOSITION FOR NATIVE SPEAKERS OF ARABIC I	3	0	3	
ENGL	101	ACADEMIC ENGLISH I	3	0	3	(ENGL 052 AND ENGL 055) OR PASSING PLACEMENT TEST
ITCS	101	INTRODUCTION TO COMPUTERS & IT	2	2	3	
MATH	101	CALCULUS I	3	0	3	MATH 053 OR PASSING PLACEMENT TEST
PHYS	101	GENERAL PHYSICS I	3	0	3	MATH 053 OR PASSING PLACEMENT TEST
STAT	101	INTRODUCTION TO STATISTICS	3	0	3	MATH 053 OR PASSING PLACEMENT TEST

TOTAL PER SEMESTER

18

SECOND SEMESTER

COURSE	CODE	COURSE TITLE	LEC.	LAB	CRE.	PREREQUISITE
ENGL	102	ACADEMIC ENGLISH II	3	0	3	ENGL 101
HIST	121	MODERN HISTORY OF BAHRAIN	3	0	3	
ITCS	122	INTRODUCTION TO PROGRAMMING TECHNIQUES	2	2	3	ITCS 101
MATH	102	CALCULUS II	3	0	3	MATH 101
PHYS	102	PHYSICS II	2	2	3	PHYS 101
HUMR	101	PRINCIPLES OF HUMAN RIGHTS	2	0	2	

TOTAL PER SEMESTER

17

SECOND YEAR (33 CREDITS)

FIRST SEMESTER

COURSE	CODE	COURSE TITLE	LEC.	LAB	CRE.	PREREQUISITE
ECCE	201	ELECTRIC CIRCUITS	2	2	3	PHYS 102 & MATH 102
ITCS	209	DISCRETE STRUCTURES	3	0	3	MATH 101
MATH	205	DIFFERENTIAL EQUATIONS	3	0	3	MATH 102
ITCS	201	OBJECT-ORIENTED PROGRAMMING I	2	2	3	ITCS 122
ENGL	201	ACADEMIC ENGLISH III	3	0	3	ENGL 102

TOTAL PER SEMESTER

15

SECOND SEMESTER

COURSE	CODE	COURSE TITLE	LEC.	LAB	CRE.	PREREQUISITE
ECCE	221	ELECTRONIC CIRCUITS	2	2	3	ECCE 201
ITCS	224	DATA STRUCTURES	2	2	3	ITCS 201
ECTE	224	SIGNALS & SYSTEMS	2	2	3	MATH 205
ECCE	203	DIGITAL LOGIC	2	2	3	ITCS 101
MATH	223	LINEAR ALGEBRA AND COMPLEX ANALYSIS	3	0	3	MATH 101
ENGL	210	TECHNICAL REPORT WRITING	3	0	3	ENGL 201

TOTAL PER SEMESTER

18

THIRD YEAR (36 CREDITS)

FIRST SEMESTER

COURSE	CODE	COURSE TITLE	LEC.	LAB	CRE.	PREREQUISITE
ECCE	303	COMPUTER ARCHITECTURE AND ORGANIZATION	2	2	3	ECCE 203
ECTE	314	COMMUNICATION SYSTEMS I	2	2	3	ECTE 224 AND ECCE 221
ITCS	323	DATABASE SYSTEMS: DESIGN AND APPLICATION	2	2	3	ITCS 224
ECTE	328	MOBILE APPLICATION DEVELOPMENT	2	2	3	ITCS 201 AND ITCS 224
STAT	302	APPLIED PROBABILITY	3	0	3	STAT 101 AND MATH 102
ECTE	329	COMPUTER NETWORKS	2	2	3	ECCE 203

TOTAL PER SEMESTER

18

SECOND SEMESTER

COURSE	CODE	COURSE TITLE	LEC.	LAB	CRE.	PREREQUISITE
ECTE	324	COMMUNICATION SYSTEMS II	2	2	3	ECTE 314
ECTE	322	ANTENNA AND WAVE PROPAGATION	2	2	3	MATH 205 AND MATH 223
ECTE	349	NETWORK ROUTING & SWITCHING	2	2	3	ECTE 329
ETHC	392	ETHICS AND PROFESSIONAL PRACTICE IN IT AND ENGINEERING	3	0	3	COMPLETION OF AT LEAST 66 CREDITS
HU/SS	XXX	HUMANITIES/ SOCIAL SCIENCES	3	0	3	

TOTAL PER SEMESTER

15

SUMMER SEMESTER

COURSE	CODE	COURSE TITLE	LEC.	LAB	CRE.	PREREQUISITE
INTR	462	BSMNE INTERNSHIP	0	0	3	COMPLETION OF AT LEAST 90 CREDITS AND MINIMUM CGPA 2

TOTAL PER SEMESTER

3

FOURTH YEAR (30 CREDITS)

FIRST SEMESTER

COURSE	CODE	COURSE TITLE	LEC.	LAB	CRE.	PREREQUISITE
ECTE	421	NETWORK DESIGN & SECURITY	2	2	3	ECTE 349
ECTE	450	DIGITAL SIGNAL PROCESSING	2	2	3	ECTE 224
IERM	498	RESEARCH METHODS IN INFORMATION TECHNOLOGY & ENGINEERING	3	0	3	COMPLETION OF AT LEAST 90 CREDITS
XXXX	XXX	MAJOR ELECTIVE I	X	X	3	
XXXX	XXX	MAJOR ELECTIVE II	X	X	3	
TOTAL PER SEMESTER					15	

SECOND SEMESTER

COURSE	CODE	COURSE TITLE	LEC.	LAB	CRE.	PREREQUISITE
ECTE	406	MULTIMEDIA COMMUNICATIONS	2	2	3	ECTE 450
ECTE	424	WIRELESS COMMUNICATIONS	2	2	3	ECTE 324 & ECTE 322
ECTE	499*	MAJOR PROJECT	0	6	3	IERM 498 & ETHC 392
XXXX	XXX	MAJOR ELECTIVE III	X	X	3	
XXXX	XXX	MAJOR ELECTIVE IV	X	X	3	
TOTAL PER SEMESTER					15	

*Equivalent to 6 practical hours

PROGRAMME ELECTIVES

COURSE	CODE	COURSE TITLE	LEC.	LAB	CRE.	PREREQUISITE
ECCE	413	INTERNET OF THINGS	2	2	3	ECCE 303 AND ECTE 329
ECCE	424	CYBER SECURITY	2	2	3	STAT 302
ECTE	414	WAN TECHNOLOGY	2	2	3	ECTE 329
ECTE	454	SATELLITE AND SPACE COMMUNICATIONS	2	2	3	ECTE 322
ECTE	472	SOFTWARE-DEFINED RADIO	2	2	3	ECTE 324
ECTE	474	OPTICAL COMMUNICATIONS	2	2	3	ECTE 324
ITCS	409	OPERATING SYSTEMS	3	0	3	ECCE 303
ITCS	422	DISTRIBUTED SYSTEMS	2	2	3	ITCS 409
ITMS	437	CLOUD SERVICES DEVELOPMENT	2	2	3	ITCS 323
ECCE	425	ENGINEERING MANAGEMENT	3	0	3	COMPLETION OF AT LEAST 90 CREDITS

COURSE DESCRIPTIONS

COURSE CODE	COURSE TITLE	LEC CREDITS	LAB CREDITS	CREDIT HOURS
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COLLEGE OF ENGINEERING

ECCE 201	ELECTRIC CIRCUITS	2	2	3
<p>This course provides electrical circuit analyses. It includes the following topics: electrical circuits overview, basic laws: Ohm's, KVL, KCL, and Power calculations, Resistive circuits: voltage and current divider rules. Dependent sources, Circuit analysis techniques: Nodal and Mesh analysis. Network theorems: Thevenin's & Norton's, Source transformation, Superposition, Maximum power transfer. Transient analysis of RC, RL and RLC circuits, Sinusoids & phasors, impedance & admittance, AC mesh & nodal analysis, AC power analysis.</p>				
ECCE 203	DIGITAL LOGIC	2	2	3
<p>This course introduces concepts and ideas of Digital Logic Design. It covers: numbering systems, Boolean Algebra, Logic Gates and combinational logic circuits analysis, combinational network design). MSI Integrated circuits in combinational networks design, and sequential circuits analysis and design. Introduction to basic PLDs, CPLDs, and FPGAs, Introduction to State machines and System design with State machines using VHDL.</p>				
ECCE 221	ELECTRONIC CIRCUITS	2	2	3
<p>This course introduces Analog electronics devices and some relevant concepts of digital Electronics. It includes topics such as: diodes (diode concepts, rectifier and wave shaping circuits), Bipolar Junction Transistors (BJT's), Field Effect Transistors (JFET, MOSFET), DC biasing IV characteristics. Operational Amplifiers and active filters. TTL and CMOS Logic, Digital-to-Analog and Analog-to-Digital converters.</p>				
ECCE 303	COMPUTER ARCHITECTURE AND ORGANIZATION	2	2	3
<p>This course introduces the organization and architecture of computer systems; It includes: instruction set principles and examples, Complex and Reduced Instruction Sets Computers (CISC and RISC), addressing modes, register transfer notation, performance evaluation and processor design, control unit, pipelining, microprogramming, memory hierarchy, cache and virtual memories, and fixed point and floating point arithmetic.</p>				
ECCE 323	MICROPROCESSORS	2	2	3
<p>This is an introductory course to Intel Microprocessors architecture and programming that builds up on the knowledge gained from the Computer architecture and Organization course.</p>				
ECCE 324	PRINCIPLES OF CONTROL SYSTEMS	2	2	3
<p>The course introduces the theory of LTI control Systems. Topics include: Review of Laplace Transforms. Mathematical modelling of physical control systems. Transfer functions, Signal flow graphs. State space analysis. Transient response of first and second order systems. Stability of control systems: Routh criterion, Root locus, Frequency response methods, Nyquist stability criterion. Introduction to z transform and digital control. Control systems applications with MATLAB are included to illustrate the concepts.</p>				
ECCE 326	DIGITAL LOGIC DESIGN	2	2	3
<p>This course provides a modern introduction to logic design and the basic building blocks used in digital systems. Topics include modular design of combinational and sequential circuits, finite state machine design, control and datapath design, modern digital design techniques using hardware description languages and programmable logic devices (FPGA, CPLD), introduction to VHDL design styles (data flow, behavioral, structural), simulation and synthesis of digital systems with VHDL. Students also learn to use industrial EDA tools such as XILINIX and ModelSim for VHDL synthesis and simulation.</p>				

COURSE CODE	COURSE TITLE	LEC CREDITS	LAB CREDITS	CREDIT HOURS
ECCE 403	EMBEDDED SYSTEMS	2	2	3
<p>This course builds on the knowledge gained from the Microprocessor courses (ECCE 323) . It focuses on embedded microprocessor-based systems. It covers Microcontroller hardware architecture. High level programming and real time operating systems for embedded systems. Software and hardware tradeoffs. Memory interfacing. I/O interfacing techniques for devices such as input/output peripherals, sensor/actuator devices, UARTS, digital and analog I/O, timers and interrupters.</p>				
ECCE 413	INTERNET OF THINGS	2	2	3
<p>This course covers the basic building blocks of the Internet of Things and develops the necessary skills required to design and implement IoT products and services. Students will be able to use sensors and an Arduino microcontroller to read data from physical world and control actuators. Use Python to program a Single Board Computer (Raspberry Pi) to perform more complex embedded program. Learn the principal application protocols for the transfer of sensor data, for example, MQTT and CoAP and infrastructure for IoT: LoRa-Wan, 6LoWPAN, 5G and SigFox.</p>				
ECCE 424	CYBER SECURITY	2	2	3
<p>This course will cover the most important concepts of cyber security, including topics such as cryptography, software security, malicious software, network security and intrusion detection. Learners would gain knowledge of various cyber security terminologies, technologies, protocols, threat analysis, security principles, security mechanisms, web security, policies, forensics, incidence response and methods/practices to secure systems.</p>				
ECCE 425	ENGINEERING MANAGEMENT	3	0	3
<p>The course introduces advanced engineering management with professional engineers to provide a technical solution and a cost and resource-effective solution. In addition, an engineer must make things happen, which manages the end-to-end processes that can lead to the transformation of a technical solution to reality. Professional Engineers are unlikely to remain in a technical position for long and will rapidly progress into some management activity. Thus, there is a need to bridge the gap between engineers and business people to meet the demands of the highly competitive engineering industry using a toolkit for future engineers.</p>				
ECCE 443	APPLIED ROBOTICS	2	2	3
<p>The Course introduces robotics-related technologies, including computer programming methodologies, data acquisition methods for sensors (such as infrared and optical imagers) and control methods for actuators and servo motors via microcontrollers. In addition, the course covers maintaining robotic system in terms of troubleshooting and servicing. The course addresses advanced robotic topics, such as computer Vision and Artificial intelligent that leads to innovative and futuristic robotic systems.</p>				
ECCE 451	MACHINE LEARNING	2	2	3
<p>Machine Learning is the study of how to build computer systems that learn from experience. This course on Machine Learning will explain how to build systems that learn and adapt using real-world applications. Some of the topics to be covered include concept learning, neural networks, genetic algorithms, reinforcement learning, instance-based learning, and so forth.</p>				
ECCE 452	COMPUTER VISION	2	2	3
<p>This course aims to provide students with the fundamentals of Computer Vision including Image Processing and classification. Topics include: Digital Images and their Properties, Image Formation, Image Acquisition, Image Segmentation and Boundary Extraction, Feature Detection and Matching, Image Classification, Scene Matching and Detection, Object Recognition, Motion Estimation, Tracking, and Classification, Computer vision applications</p>				

Please refer to the program study plan to identify the prerequisite for the courses listed in this document.

COURSE CODE	COURSE TITLE	LEC CREDITS	LAB CREDITS	CREDIT HOURS
ECCE 499	MAJOR PROJECT	0	6	3
<p>Each student is required to select a theoretical and/or a practical problem related to his major area, and works under the supervision of a faculty member. All stages of project development should be emphasized including problem identification, library search, planning, design and/or construction of equipment upon completion of the project, the student must submit a final written report outlining the various phases of the project and make an oral presentation.</p>				
ECTE 201	DATA NETWORKS	2	2	3
<p>This course introduces data communication networking. It includes: foundational principles of computer networks, architecture of data communication systems, OSI model, protocols and mechanisms used in the TCP/IP protocol suite, including the operation of both wide-area and local-area networks.</p>				
ECTE 224	SIGNALS & SYSTEMS	2	2	3
<p>This course gives an overview of continuous-time signals and systems. It covers: Basic characteristics of signals, Fourier analysis of continuous -time signals, properties of Linear Time-Invariant (LTI) systems, The Convolution integral, Impulse and step responses of LTI systems, concept of Transfer Function including basic properties of Laplace, and applications of signals and systems concepts in control and signal processing.</p>				
ECTE 314	COMMUNICATION SYSTEMS I	2	2	3
<p>This course introduces and emphasizes essential analytical tools and theories of communication systems. It covers mainly analog communication: analog modulation (AM, FM, PM); frequency division multiplexing and filtering; A/D and D/A conversions (sampling theory, PAM, Quantization, PCM, and Delta modulation)</p>				
ECTE 322	ANTENNA AND WAVE PROPAGATION	2	2	3
<p>To introduce students to antennas and propagation for wireless communications as well as the analysis and design of antennas. The course begins with a review of vector calculus and coordinate transformations. It covers fundamental concepts of electrostatics, magnetostatics, electromagnetic induction and electromagnetic waves. Students gain knowledge of Maxwell's Equations and learn how to apply them to solve practical electromagnetic fields problems. Other concepts such as waveguides, resonant cavities, antennas, and radiation patterns are also introduced in this course.</p>				
ECTE 324	COMMUNICATION SYSTEMS II	2	2	3
<p>This course builds on the knowledge gained from the previous communication course (ECTE 314). It focuses on digital communication: digital modulation (ASK, FSK, PSK, QAM); transmission of digital data over baseband channel (line coding, block coding, scrambling); error detection and correction (hamming distance, linear block codes, cyclic codes, checksum, forward error correction); time division multiplexing.</p>				
ECTE 328	MOBILE APPLICATION DEVELOPMENT	2	2	3
<p>The course introduces an in-depth review of concepts, design strategies, tools and Application Programme Interfaces (APIs) needed to create, test and deploy advanced applications for mobile phones and occasionally connected mobile devices. Topics include: design of mobile user interfaces, Activities, handling notifications, user interface design, user interface building, interprocess communication, data processing, content providers, background services, geo-location and mapping, networking and web services, telephony, messaging, peer-to-peer communication. The target computing environment changes overtime; currently the course explores the Android Operating System and its supporting SDK.</p>				

COURSE CODE	COURSE TITLE	LEC CREDITS	LAB CREDITS	CREDIT HOURS
ECTE 329	COMPUTER NETWORKS	2	2	3
<p>This course focuses on the underlying concepts and technologies of computer networking. Topics covered include standards; transmission basics and media; TCP/IP protocol; network topologies; network hardware, switching, routing, and virtual networks; and network applications such as e-mail and the Web, peer-to-peer file sharing.</p>				
ECTE 349	NETWORK ROUTING & SWITCHING	2	2	3
<p>Network Routing & Switching course will enable the learners with advanced skills, knowledge and understanding to install, operate, configure, and verify IPv4 and IPv6 Small to Medium Enterprise networks, including configuring a LAN switch, configuring an IP router, identifying basic security threats, understanding redundant topologies, troubleshooting common network issues, connecting to a wide-area network (WAN), configuring EIGRP and OSPF, understanding WAN technologies.</p>				
ECTE 406	MULTIMEDIA COMMUNICATIONS	2	2	3
<p>This course introduces technologies for multimedia communications. The course considers each part of a multimedia application, i.e. voice, video, and data individually, and how to effectively represent multimedia data, including text, image, audio, and video. Covering different issues related to general behaviors, format, representation, multimedia coding standards, including Huffman coding, JPEG/JPEG-2000, H.26x, MPEG, encoding-decoding techniques, and telecommunication media requirements.</p>				
ECTE 414	WAN TECHNOLOGY	2	2	3
<p>This course discusses typical Wide Area Network (WAN) technologies along with survey on existing services and applications. WAN router configuration and troubleshooting skills will be included. Topics to be covered include Fundamental WAN devices, Routers, Switches, authentication, PAP, CHAP, WAN Tunnelling and VPN</p>				
ECTE 421	NETWORK DESIGN & SECURITY	2	2	3
<p>This course provides an overall scheme for designing secure multimedia networks. It covers the following concepts: Application requirements Analysis, Switching Technology, Traffic Modeling, QoS, Network Security.</p>				
ECTE 424	WIRELESS COMMUNICATIONS	2	2	3
<p>This course introduces Modern wireless communication principles and techniques. It focuses on Cellular communication fundamentals (design, interference and capacity, trunking and traffic models, air interface, propagation models and mechanisms, large/small scale fading, diversity techniques); spread spectrum coding; current and future wireless systems and standards, and an introduction to optical communication.</p>				
ECTE 450	DIGITAL SIGNAL PROCESSING	2	2	3
<p>This course presents the theory and practice of digital signal processing. It covers: Discrete-time signals, sampling and reconstruction of signals, time and frequency analysis of discrete-time signals and systems, Z-transform applications to signal processing; discrete Fourier transform: properties, applications and computation methods with emphasis on fast Fourier transform; analysis and design of digital filters and DSP applications. The course concludes with a brief introduction to 2-D signal (image) processing.</p>				
ECTE 454	SATELLITE AND SPACE COMMUNICATIONS	2	2	3
<p>This course covers topics such as Introduction and Background, Orbital Aspects and Launching, Spacecraft Subsystems, Link Budgets, Modulation, Multiple Access & On - board Processing, Coding, Frequency & Propagation Aspects, Earth Station Technology & VSATs, Non-Geosynchronous Orbits (NGSO), Applications (GPS, Mobile, Internet, etc.)</p>				

Please refer to the program study plan to identify the prerequisite for the courses listed in this document.

COURSE CODE	COURSE TITLE	LEC CREDITS	LAB CREDITS	CREDIT HOURS
ECTE 472	SOFTWARE-DEFINED RADIO	2	2	3
<p>This course covers all aspects of SDR technology. Specifically, it includes an overview of modern wireless systems, transceiver architectures, baseband signal processing algorithms, analog-to-digital converters, radio front-end components, digital hardware architectures, software architectures, middleware and the Software Communications Architecture (SCA), cognitive devices and networks, standardization bodies, software-defined radio products and services.</p>				
ECTE 474	OPTICAL COMMUNICATIONS	2	2	3
<p>The course provides an overview of optical communication system (from source to destination) with a particular focus on physical and protocol parts of optical systems. Topics include Optics and wave propagation for fiber optics, light emitting diodes and diode lasers, optical fiber, optical amplifiers, dispersion, wavelength multiplexing, detectors and noise, system architecture for optical communication. Students will then learn and understand the point-to-point optical communication concept and will be introduced to the WDM concept. Finally, GMPLS protocol will be briefly discussed.</p>				
ECTE 499	MAJOR PROJECT	0	6	3
<p>Each student is required to select a theoretical and/or a practical problem related to his major area, and works under the supervision of a faculty member. All stages of project development should be emphasized including problem identification, library search, planning, design and/or construction of equipment upon completion of the project, the student must submit a final written report outlining the various phases of the project and make an oral presentation.</p>				
IERM 498	RESEARCH METHODS IN INFORMATION TECHNOLOGY & ENGINEERING	3	0	3
<p>The course introduces the essential aspects of designing, supporting, and conducting a research project. It enables students to develop capacity to conduct small, simple research projects while at the university. The course spans multiple elements including time management, writing and presentation skills, literature search and general considerations for experiment design and planning.</p>				
INTR 461	BSCCE INTERNSHIP	0	0	3
<p>The main objective of the Internship is to integrate the concepts that students learn in the Computer and Communication Engineering programme with practical experience by providing a training program that supplements and complements classroom work</p>				
INTR 462	BSMNE INTERNSHIP	0	0	3
<p>The main objective of the Internship is to integrate the concepts that students learn in the Mobile and Network Engineering programme with practical experience by providing a training program that supplements and complements classroom work.</p>				



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