



## Course Work Requirements Structure for Institute of Basic and Applied Sciences (BAS)

### Preparatory Courses:

The objectives of the preparatory courses are:

- To cover the deficiencies of E-JUST PG applicants in the basic research skills, English languages, computer programming, statistics and liberal arts.
- To prepare E-JUST PG students to the required nature of PG study in E-JUST including Japanese culture, Japanese language, Arabic language for international students, Research and Publications ethic and method.
- To make the PG students familiar with E-JUST labs, center of excellences and professors before registering the point of research and before the formation of the supervision committee.

This will help the student in the proper selection of the research point and supervision committee.

### Study System:

**36 credit hours for the MSc program:** 21 credit hours: courses. 15 credit hours thesis

**48 credit hours for the PhD program:** 21 credit hours: courses. 27 credit hours thesis

### Course Work Requirements Structure:

- ✓ **Preparatory Courses : University Requirements (4 Courses);** each of 1 credit hour and **Department Courses;** 2 Courses (1 Hr.)
- ✓ **Program Courses (2 Courses);** each of 1 credit hour
- ✓ **Research Elective courses (3 Courses);** each course (3) credit hour.

Student has to successfully finish the preparatory courses before the registration of the point of research and the formation of the supervision committee.



In case the student registers PhD after getting MSc from E-JUST, he/she will be exempted from the preparatory courses (6 credits).

### Program Compulsory Core Courses:

1. Each program has two core compulsory courses for the program; each course three hours credits. These courses are compulsory courses for the program.
2. The student has to register the program compulsory core courses with the preparatory courses in the first year.
3. In case the student registers PhD after getting MSc from E-JUST, he/she may be exempted from the program compulsory core courses if the PhD and MSc subjects are in the same specialization and track.

### Program Research Elective Courses:

1. Each program has three courses related to the research topics; each course is three credit hours.
2. These three courses are elective courses from a group of courses for each program.
3. Two of these courses should be selected from a group of courses of level 500 for MSc students and of level 600 for PhD students, one of these three courses can be selected from another graduate program.
4. The third course is a project-based learning course and should be selected from a group of courses of level 700.
5. The three courses should be selected related to the student research track according to the recommendations of the main supervisor.

## Institute of Basic and Applied Sciences courses

### Preparatory Courses

#### University Requirements Preparatory Course

No	Course Code	Course Name	Cr. Hr.	Conditions
1	PRE 401	English Language	1	Mandatory for students who do not have the English Score requirements for graduation.
	PRE 402	Arabic Language	1	Mandatory for foreign students (non-Arabic nation students).
2	PRE 403	Japanese Language	1	Mandatory for non-Japanese students who did not graduated from EJUST.
3	PRE 404	Japanese Culture	1	Mandatory for all students.
4	PRE 405	Research Skills and method.	1	Mandatory for all students.

#### Preparatory year Courses with Zero Credit

No	Course Code	Course Name	Cr. Hr.	Conditions
1	PRE 407	Engineering Mathematics	0	
2	PRE 408	Technical Writing and Seminar Skills	0	
3	PRE 409	Advanced English Language	0	

### Program Requirements Preparatory Courses

Prog.	Code	Course Name	Cr. Hr	Responsibility
NAN	PRE 411	Fundamentals of Materials science	1	NAN
	PRE 412	Micro Electromechanical Systems (MEMS)	1	NAN
	PRE 413	Thin Film Science	1	NAN
	PRE 414	Instrumental Methods of Analysis	1	NAN
	PRE 415	Air Pollution	1	NAN
	PRE 416	Advanced Organic Chemistry	1	NAN
	PRE 417	Environmental Chemistry	1	NAN
	PRE 418	Advanced Analytical Chemistry	1	NAN
	PRE 418	Special Topics in Chemistry	1	NAN
	PRE 441	Introduction to Computational Methods with MATLAB	1	ACM
BIO	PRE 441	Introduction to Computational Methods with MATLAB	1	ACM
	PRE 421	Animal Physiology	1	BIO
	PRE 422	Plant Physiology	1	BIO
	PRE 423	Microbiology	1	BIO
	PRE 424	General Biochemistry	1	BIO
	PRE 425	Analytical techniques and application	1	BIO
	PRE 426	Quality management, quality control and quality assurance	1	BIO
	PRE 427	Genetics and molecular genetics.	1	BIO
	PRE 428	Tumor Biology	1	BIO
	PRE 429	Basic Organic Chemistry	1	BIO
	PRE 430	General analytical chemistry	1	BIO
	PRE 431	Fundamentals of Medicinal Chemistry	1	BIO
	PRE 432	Drug Analysis, instrumentation and Quality control	1	BIO
	PRE 433	Chemistry of Drugs and process development	1	BIO
	PRE 434	Food Safety and Food borne pathogens	1	BIO



	PRE 435	Bioremediation	1	BIO
	PRE 436	Introduction to Genetic Engineering	1	BIO

Prog.	Code	Course Name	Cr. Hr	Responsibility
ACM	PRE 441	Introduction to Computational Methods with MATLAB	1	ACM
	PRE 442	Probability and Statistics	1	ACM
EMA	PRE 451	Modelling and simulation of Physical Problems	1	EMA
	PRE 452	Introduction to Band theory	1	EMA
	PRE 453	Introduction to Materials Crystallography	1	EMA
	PRE 454	Physics of Solid Materials	1	EMA
	PRE 455	Fundamentals of Applied Quantum Mechanics	1	EMA
	PRE 456	Introduction to Electronic Devices	1	EMA

## PROGRAM COURSES:

### NANOSCIENCE PROGRAM COURSES

Code	Course Name	Cr. Hr
<b>Compulsory Core Courses</b>		
NAN 501	Fundamentals of nanoscience	3
NAN 502	Synthesis and characterization of nanomaterials	3
<b>Level 500 Elective Courses</b>		
NAN 503	Nanocomposite materials	3
NAN 504	Colloids and nanoparticles	3
NAN 505	Self-assembled nanostructures	3
NAN 506	Sensors and actuators	3
NAN 507	Nanomaterials for environment applications	3
NAN 508	Green synthesis of nanomaterials	3
NAN 509	Surfaces and thin films	3
NAN 510	Membrane science for filtration and separation applications	3
<b>Level 600 Elective Courses</b>		
NAN 601	Processing and applications of nanomaterials	3



Code	Course Name	Cr. Hr
NAN 602	Nanomaterials for energy production and storage	3
NAN 603	Optical and photonic properties of nanostructures	3
NAN 604	Thermodynamics and statistical mechanics of nanomaterials	3
NAN 605	Nano porous materials	3
NAN 606	Nano catalysis	3
NAN 607	Computational chemistry	3
NAN 608	Supramolecular materials and medicine	3
NAN 609	Current topics in nanoscience	3
<b>Level 700 Project-Based Learning/ Research Seminar Courses</b>		
NAN 701	Project-based learning in Nanoscience	3
NAN 702	Seminars on advanced topics on nanomaterials synthesis and characterization.	3
NAN 703	Seminars on advanced topics on nanomaterials application.	3

## Biotechnology Program Courses

Course Code	Course Name	Cr. Hrs
<b>Compulsory Core Courses</b>		
BIO 501	Molecular Biology and Genetic Engineering	3
BIO 502	Advanced Microbiology and Microbiological Techniques	3
<b>Level 500 Elective Courses</b>		
BIO 503	Advanced enzymology and cofactors	3
BIO 504	Hormones (biosynthesis and action)	3
BIO 505	Techniques of cell and tissue cultures	3
BIO 506	Molecular bases of plant stresses	3
BIO 507	Biotechnology and food industry	3
BIO 508	Bioethics and bio-safety in biotechnology	3
<b>Level 600 Elective courses</b>		
BIO 601	Molecular aspects of cell signaling	3
BIO 602	Genomics, proteomics and metabolomics	3
BIO 603	Bioreactors (Design, operation and product collection)	3
BIO 604	Bioremediation (Cleaning polluted air, water and soil)	3
BIO 605	Bio-fuel production (from bacteria and algae)	3
BIO 606	Bio-fertilizers and bio-pesticides	3
BIO 607	Nano-biotechnology	3
BIO 608	Biostatistics	3
<b>Level 700 Project-Based Learning /Research Seminar Courses</b>		
BIO 701	Project-Based Learning in Agricultural Biotechnology	3
BIO 702	Project-Based Learning in Food Biotechnology	3
BIO 703	Seminars on Advanced Topics on Agricultural Biotechnology	3
BIO 704	Seminars on Advanced Topics on Food Biotechnology	3

## Applied and Computational Mathematics Program Courses

Course Code	Course Name	Cr. HR.
<b>Compulsory Core courses</b>		
ACM 501	Partial differential equations	3
ACM 502	Numerical analysis	3
<b>Level 500 Elective Courses</b>		
ACM 503	Advanced numerical methods for differential equations	3
ACM 504	Applied linear algebra	3
ACM 505	Dynamical systems	3
ACM 506	Fractional differential equations I	3
ACM 507	Scientific computing	3
ACM 508	Applied functional analysis	3
ACM 509	Mathematical and computational modeling in science and engineering	3
<b>Level 600 Elective Courses</b>		
ACM 601	Advanced ordinary differential equations	3
ACM 602	Finite element analysis	3
ACM 603	Computational methods for partial differential equations	3
ACM 604	High performance computing I	3
ACM 605	High performance computing II	3
ACM 606	Fractional differential equations II	3
ACM 607	Computational science and engineering	3
ACM 608	Selected topics in applied and computational mathematics	3
<b>Level 700 Project-Based-Learning/ Research Seminar Courses</b>		
ACM 701	Project based learning in applied and computational mathematics	3
ACM 702	Seminars on advanced topics in applied and computational mathematics I	3
ACM 703	Seminars on advanced topics in applied and computational mathematics II	3





## Energy Materials Program

Course Code	Course Name	Cr. Hrs.
<b>Compulsory Core courses</b>		
MER 501	Materials structures and defects	3
MER 502	Energy resources and storage economics and environment	3
<b>Level 500 Elective courses</b>		
EMA 503	Materials science for energy applications	3
EMA 504	Chemistry for energy science	3
EMA 505	Semiconductors materials and processing	3
EMA 506	Thermodynamics of materials	3
EMA 507	Solar, wind and biomass energies	3
EMA 508	Optical properties of luminescent materials	3
EMA 509	Device physics	3
<b>Level 600 Elective Courses</b>		
EMA 601	Smart materials and structures	3
EMA 602	Chemical and statistical thermodynamics	3
EMA 603	Topics on fuel cells	3
EMA 604	Solid state chemistry and its applications	3
EMA 605	Biomaterials	3
EMA 606	Solar photovoltaics: fundamentals, technology, and applications	3
EMA 607	Advanced instrumentations and materials analysis	3
EMA 608	Materials and devices for energy conversion	3
EMA 609	Nanomaterials and energy	3
<b>Level 700 Project-Based Learning/ Research Seminar Course</b>		
EMA 701	Project-based learning in energy materials	3
EMA 702	Research seminars on advanced topics in energy materials I	3
EMA 703	Research seminars on advanced topics in energy materials II	3

## Space Environment Program

Course Code	Course Name	Cr. Hrs.
<b>Compulsory Core courses</b>		
SEN 501	Space Weather	3
SEN 502	Space Plasma Physics	3
<b>Level 500 Elective courses</b>		
SEN 503	Solar Physics	3
SEN 504	Geomagnetism	3
SEN 505	Global Navigation Satellite Systems	3
SEN 506	Heliospheric Physics	3
SEN 507	Ionospheric Physics	3
SEN 508	Cosmic Rays	3
SEN 509	GIS in Meteorology and Climate Science	3
SEN 510	Introduction to Space Chemistry (I)	3
<b>Level 600 Elective Courses</b>		
SEN 601	Advanced Space Plasma	3
SEN 602	GNSS Remote Sensing	3
SEN 603	Space Weather and Climate Variability	3
SEN 604	Solar Physics and Magnetohydrodynamics	3
SEN 605	Advance Heliospheric Physics	3
SEN 606	Radio Astronomy	3
SEN 607	Elementary Particles	3
SEN 608	Earth's Atmosphere	3
SEN 609	Materials for Space	3
SEN 610	Introduction to Space Chemistry (II)	3
<b>Level 700 Project-Based Learning/ Research Seminar Course</b>		
SEN 701	Project-based learning in Space Environment	3
SEN 702	Research seminars on advanced topics in the Space Environment I	3
SEN 703	Research seminars on advanced topics in the Space Environment II	3