

ORIENTATION MESSAGE FOR THE ACADEMIC YEAR 2020/2021

PHYSICAL SCIENCES DEPARTMENT

Dear Students,

I would like to take this opportunity to congratulate all new students for gaining admission to the Open University of Tanzania. A grand welcome to you all to the Faculty of Science, Technology and Environmental Studies (FSTES).

As you are already informed from the previous message of the Dean-FSTES, Physical Sciences department is one of the five departments forming our faculty. This message is therefore meant to highlight some key academic matters you ought to know which relate to the Physical sciences department.

Physical sciences department offers courses which touch three subject areas, namely, Chemistry, Mathematics and Physics. Course codes representing names of the courses that we offer, use abbreviations OCH, OMT and OPH which stand for Chemistry, Mathematics and Physics courses, respectively. Courses that are being offered in Physical sciences department feature in the following three degree programmes of the FSTES: Bachelor of Science General (BSc. Gen.), Bachelor of Science with Education (BSc. Edu.) and Bachelor of Sciences in Energy Resources (BSc. ER). It is the intention of this message to take you through various course structures that are found in the mentioned three degree programmes. Each course structure gives details of the courses one is supposed to study for each academic level, showing clearly the core courses and the elective courses, as well as indicating the weight of each course in terms of units. You are therefore advised to carefully read the course structure, particularly the one which falls under the degree programme you are taking, so that you know clearly what you are supposed to study, right from the beginning. In case you get stuck anywhere, feel free to contact the head of department for more clarification.

A) BACHELOR OF SCIENCE GENERAL:

1) Summary of Programme:

Course Name: Bachelor of Science General
Course Initials: BSc Gen.
Duration: 3-8 years.
Total Units: 38.
Mode of Delivery: Blended mode of delivery (e-learning).

2) Programme Structure:

The mentioned programme lead to a variety of career opportunities including scientists working in: industries, metrological agencies, scientific laboratories, academic institutions and one can be self-employed. A student taking Bachelor of Science General degree programme under Physical sciences department can study a combination of TWO SUBJECTS, one major and one minor, from among the following that are being offered in the Department: Chemistry, Mathematics and Physics. Or, a student can choose ONE major subject from any of the mentioned subjects, and ONE minor subject from any other Department in the Faculty (e.g. ICT, Biology, etc.), or from another relevant Faculty (e.g. Economics, Geography, etc.). Likewise, it is worth knowing that there are two programmes being offered in Mathematics, namely, *Single Mathematics Programme*

and *Double Mathematics Programme*. These programmes are studied in three levels within three to eight years as it is the case for other science subjects' areas.

For the *Single Mathematics Programme*, Mathematics is studied as a single subject along with another subject such as Chemistry, Physics, etc. Students in this programme fall into two categories: MINOR AND MAJOR. On the other hand, for the *Double Mathematics Programme*, Mathematics is being treated as a double subject, so students do not take any other subject. Details of programme structure, showing courses in clusters are given hereunder. It is important to note that all courses that appear as core courses are mandatory and not optional; hence students taking a respective programme are supposed to take all core courses in that programme.

CLUSTERS FOR MAJOR IN MATHEMATICS

Code & Name	Credits	Units	Status
LEVEL I CLUSTERS			
OFC 017: Communication Skills	10	1	Core
OCP 100: Introduction to Microcomputer Studies	10	1	Core
OMT 151: Mathematical Analysis I & II	20	2	Core
OMT 152: Linear Algebra I & II	20	2	Core
OMT 153: Probability and Statistics I & II	20	2	Core
OMT 154: Informatics & Programming Languages	20	2	Core
LEVEL II CLUSTERS			
OMT 203: Advanced Calculus	10	1	Core
OMT 205: Differential Equations	10	1	Core
OMT 251; Methods & Partial Differential Equations	20	2	Elective
OMT 252: Numerical Analysis I & II	20	2	Elective
OMT 225: Applied Vector Theory	10	1	Elective
OMT 255: Real Analysis I & II	20	2	Core
LEVEL III CLUSTERS			
OMT 324: Complex Analysis	10	1	Core
OMT 351: Abstract Algebra I & II	30	3	Elective

CLUSTERS FOR MINOR IN MATHEMATICS

Code & Name	Credits	Units	Status
LEVEL I CLUSTERS			
OMT 151: Mathematical Analysis I & II	20	2	Core
OMT 152: Linear Algebra I & II	20	2	Core
OMT 153: Probability and Statistics I & II	10	1	Core
OMT 154: Informatics & Programming Languages	20	2	Core
LEVEL II CLUSTERS			
OMT 205: Differential Equations	10	1	Core
OMT 252: Numerical Analysis I & II	20	2	Elective

OMT 225: Applied Vector Theory	10	1	Elective
LEVEL III CLUSTERS			
OMT 324: Complex Analysis	10	1	Core

CLUSTERS FOR DOUBLE MAJOR IN MATHEMATICS

Code & Name	Credits	Units	Status
LEVEL I CLUSTERS			
OFC 017: Communication Skills	10	1	Core
OCP 100: Introduction to Microcomputer Studies	10	1	Core
OMT 151: Mathematical Analysis I & II	20	2	Core
OMT 152: Linear Algebra I & II	20	2	Core
OMT 153: Probability and Statistics I & II	20	2	Core
OMT 154: Informatics & Programming Languages	20	2	Core
LEVEL II CLUSTERS			
OMT 203: Advanced Calculus	10	1	Core
OMT 205: Differential Equations	10	1	Core
OMT 251; Methods & Partial Differential Equations	20	2	Elective
OMT 252: Numerical Analysis I & II	20	2	Elective
OMT 253: Survey and Quality Control	20	2	Elective
OMT 209 Fluid Mechanics I	10	1	Core
OMT 216: Operational Research I	10	1	Elective
OMT 217: Number Theory I	10	1	Core
OMT 225: Applied Vector Theory	10	1	Elective
OMT 255: Real Analysis I & II	20	2	Core
OMT 254: Advanced Statistics, Design and Analysis of Experiment	20	2	Elective
LEVEL III CLUSTERS			
OMT 303: Measure Theory	10	1	Core
OMT 304: Differential Geometry	10	1	Elective
OMT 305: Topology I	10	1	Core
OMT 352: Test of Hypothesis & Theory of Estimation	20	2	Elective
OMT 324: Complex Analysis	10	1	Core
OMT 351: Abstract Algebra I & II	30	3	Elective

CLUSTERS OF PHYSICS MAJOR COURSES

Code & Name	Credits	Units	Status
LEVEL I CLUSTERS			
OFC 017: Communication Skills	10	1	Core

OCP 100: Introduction To Microcomputer Studies	10	1	Core
OPH 151: Introductory University Physics	30	3	Core
OPH 152: Electromagnetism I & II	20	2	Core
OPH 350A: Physics Practicals	*	*	Core
LEVEL II CLUSTERS			
OPH 251: Mathematical Physics	20	2	Core
OPH 252: Optics	20	2	Core
OPH 208: Thermal Physics II	10	1	Core
OPH 350B: Physics Practicals	*	*	Core
LEVEL III CLUSTERS			
OPH 351: Physics of the Atom	20	2	Core
OPH 352: Quantum Theory of Solids	20	2	Core
OPH 411: Applied Earth Physics	30	3	Elective
OPH 441: Analog Electronics	20	2	Core
OPH 442: Digital Electronics	20	2	Elective
OPH 443: Microelectronics	20	2	Elective
OPH 350C: Physics Practicals	*	*	Core
OPH 305: Physics Special Project	10	1	Core

*OPH 350A, B, C accumulated to 10 credits (1 unit) after completion

CLUSTERS OF PHYSICS MINOR COURSES

Code & Name	Credits	Units	Status
LEVEL I CLUSTERS			
OPH 151: Introductory University Physics	30	3	Core
OPH 152: Electromagnetism I & II	20	2	Core
OPH 251: Mathematical Physics	20	2	Elective
OPH 350A: Physics Practicals	*	*	Core
LEVEL II CLUSTERS			
OPH 252: Optics	20	2	Core
OPH 208: Thermal Physics II	10	1	Elective
OPH 351: Physics of the Atom	20	2	Core
OPH 350B: Physics Practicals	*	*	Core
LEVEL III CLUSTERS			
OPH 352: Quantum Theory of Solids	20	2	Elective
OPH 411: Applied Earth Physics	30	3	Elective
OPH 441: Analog Electronics	20	2	Core
OPH 442: Digital Electronics	20	2	Elective
OPH 443: Microelectronics	20	2	Elective
OPH 350C: Physics Practicals	*	*	Core

*OPH 350A, B, C accumulated to 10 credits (1 unit) after completion

CLUSTERS FOR CHEMISTRY MAJOR

Code & Name	Credits	Units	Status
LEVEL I CLUSTERS			
OFC 017: Communication Skills	10	1	Core
OCP 100: Introduction To Microcomputer Studies	10	1	Core
OCH 151: General and Physical Chemistry	20	2	Core
OCH 152: Organic Chemistry	20	2	Core
OCH 104: Systematic Inorganic Chemistry	10	1	Core
OCH 105: Chemical Thermodynamics	10	1	Core
OCH 350A: Chemistry Practicals	*	*	Core
LEVEL II CLUSTERS			
OCH 251: Organic Spectroscopy	20	2	Elective
OCH 252: Organic Reaction Mechanism	20	2	Core
OCH 253: Advanced Inorganic Chemistry	30	3	Core
OCH 206: Chemical Bonding	10	1	Core
OCH 254: Analytical Chemistry	20	2	Core
OCH 255: Natural Products & Carbohydrates Chemistry	20	2	Elective
OCH 350B: Chemistry Practicals	*	*	Core
LEVEL III CLUSTERS			
OCH 351: Chemical Kinetics & Electrochemistry	20	2	Core
OCH 303: Industrial Organic Chemistry	10	1	Elective
OCH 309: Theoretical Chemistry	10	1	Elective
OCH 350C: Chemistry Practicals	*	*	Core
OCH 307: CHEMISTRY SPECIAL PROJECT	10	1	Core

*OCH 350A, B, C accumulated to 10 credits (1 unit) after completion

CLUSTERS FOR CHEMISTRY MINOR

Code & Name	Credits	Units	Status
LEVEL I CLUSTERS			
OCH 151: General and Physical Chemistry	20	2	Core
OCH 152: Organic Chemistry	20	2	Core
OCH 104: Systematic Inorganic Chemistry	10	1	Core
OCH 105: Chemical Thermodynamics	10	1	Core
OCH 350A: Chemistry Practicals	*	*	Core
LEVEL II CLUSTERS			
OCH 251: Organic Spectroscopy	20	2	Elective

OCH 252: Organic Reaction Mechanism	20	2	Elective
OCH 253: Advanced Inorganic Chemistry	30	3	Elective
OCH 206: Chemical Bonding	10	1	Core
OCH 254: Analytical Chemistry	20	2	Core
OCH 255: Natural Products & Carbohydrates chemistry	20	2	Elective
OCH 350B: Chemistry Practicals	*	*	Core
LEVEL III CLUSTERS			
OCH 351: Chemical Kinetics & Electrochemistry	20	2	Core
OCH 303: Industrial Organic Chemistry	10	1	Elective
OCH 309: Theoretical Chemistry	10	1	Elective
OCH 350C: Chemistry Practicals	*	*	Core

*OCH 350A, B, C accumulated to 10 credits (1 unit) after completion

3) Programme Outcomes:

On successful completion of the physical sciences subjects, students should be able to:

- Apply the acquired knowledge in a variety of career opportunities including working in industries, metrological agencies, scientific laboratories and academic institutions.
- Explain and interpret correctly all key experimental observations they come across while doing practical/field works, hence becoming true scientists who qualify to either be employed or self-employ in any relevant scientific institution.
- Proceed doing further research in higher degrees programmes if one wishes to do so.

4) Assessment:

The Bachelor of Science General programme follows general OUT assessment procedure.

Candidates shall be assessed in the modules for which they have enrolled for each year of study. Within each module candidates shall be assessed by a combination of Main timed test (30%) and annual examination (70%). The pass mark shall be 40 for each assessment element and for the module overall.

The course assessment also includes written reports of practical work with an equivalent weight of 2 units. These are marked out 100% for each module, in which case the scores will be awarded by the teacher responsible for the course and / or practical session. However the overall grade will be determined by the average of the sub grades at each level of study. Therefore the final overall grade will be computed at level three after completing all the practical sessions of all the modules studied.

The coursework also includes written report of project which is done at level three when a student has completed at least two-thirds of the total number of units required for graduation.

B) BACHELOR OF SCIENCE WITH EDUCATION:

1) Summary of Programme:

Course Name: Bachelor of Science with Education
Course Initials: BSc Edu.
Duration: 3-8 years.
Total Units: 38.
Mode of Delivery: Blended mode of delivery (e-learning).

2) Programme Structure:

The mentioned programme lead to a variety of career opportunities including scientists working in: industries, metrological agencies, scientific laboratories, academic institutions, secondary schools as science teachers and one can be self-employed. A student taking Bachelor of Science with Education degree programme under Physical sciences department must study a combination of two subjects that are taught in schools together with courses from the Faculty of Education. Teaching subjects being offered by the Department of Physical Sciences are: Chemistry, Mathematics and Physics. A student can also choose a subject from another Department in the Faculty (e.g. ICT, Biology, etc.), or from another relevant Faculty (e.g. Economics, Geography, etc.).

Details of programme structure, showing courses in clusters are given hereunder. It is important to note that all courses that appear as core courses are mandatory and not optional; hence students are supposed to take all core courses in this programme.

COURSE STRUCTURE FOR MATHEMATICS

LEVEL 1

Core courses

Code	course Title	Credits	Units
OMT 111	Mathematical Analysis	20	2
OMT 112	Linear Algebra I	10	1
OMT 114	Probability and Statistics	20	2
OMT 115	Introduction to Mathematical Logic and Set Theory	10	1
Total		60	6

ELECTIVE courses

Code	Course Title	Credits	Units
OMT 113	Linear Algebra II	10	1
OMT 116	History of Mathematics	10	1
Total		20	2

LEVEL 2

CORE COURSES

Code	course Title	Credits	Units
OMT 221	Numerical Methods	10	1

OMT 224	Ordinary Differential Equation	10	1
OMT 228	Linear Programming	10	1
OMT 230	Mathematical Programming with MATLAB	10	1
Total		40	4

ELECTIVE Courses

Code	Course Title	Credits	Units
OMT 222	Numerical Analysis	10	1
OMT 223	Computer Programming	10	1
OMT 227	Real Analysis	20	2
OMT 229	Number Theory	10	1
OMT 231	Mathematical Methods	10	1
OMT 232	Advanced Calculus	10	1
OMT 233	Sample Survey and Quality Control	20	2
OMT 234	Advanced Statistics, Design and Analysis of Experiments	20	2
OMT 235	Discrete Mathematics	10	1
OMT 236	Fluid Mechanics	10	1
OMT 237	Applied Vector theory	10	1
Total		140	14

LEVEL 3

CORE COURSES

Code	Course Title	Credits	Units
OMT 333	Complex Analysis	10	1
Total		10	1

ELECTIVE Courses

Code	course Title	Credits	Units
OMT 331	Topology	10	1
OMT 332	Partial Differential Equations	10	1
OMT 334	Abstract Algebra	20	2
OMT 335	Mathematics Project	20	2
OMT 336	Measure Theory	10	1
OMT 337	Differential Geometry	10	1
OMT 338	Functional Analysis	10	1
OMT 339	Integer and Non-Linear Programming	10	1
OMT 340	Theory of Estimation and Tests of Hypothesis	20	2
OMT 341	Networks and Transportation Problems	10	1
Total		130	13

COURSE STRUCTURE FOR CHEMISTRY

LEVEL 1

Core courses

Code	Course Title	Credits	Units
OCH 111	Physical Chemistry	10	1
OCH 112	Inorganic Chemistry	10	1
OCH 113	Organic Chemistry	20	2
OCH 114*	Introductory Chemistry for Biology Students	10	1
OCH 320	Chemistry Practical	*	*

ELECTIVE courses

Code	Course Title	Credits	Units
OCH 115	AROMATICITY	10	1

**NOT FOR CHEMISTRY MAJOR*

LEVEL 2

CORE COURSES

Code	Course Title	Credits	Units
OCH 211	Basic Analytical Chemistry	10	1
OCH 213	Advanced Inorganic Chemistry	30	3
OCH 320	Chemistry Practical	*	*

ELECTIVE courses

Code	Course Title	Credits	Units
OCH 212	Basic Organic Spectroscopy	10	1
OCH 214	Organic Reaction Mechanism	10	1
OCH 215	Chemical Thermodynamics	10	1
OCH 216	Organic Stereochemistry	10	1
OCH 217	Chemistry of Natural Products	10	1
OCH 218	Forensic Chemistry	10	1
OCH 219	Medicinal Chemistry	10	1

LEVEL 3

CORE COURSES

Code	Course Title	Credits	Units
OCH 311	Chemical Kinetics & Electrochemistry	20	2
OCH 312	Instrumental Methods in Analytical Chemistry	10	1
OCH 320	Chemistry Practicals	*	*

*OCH 320A, B, C accumulated to 10 credits after completion.

ELECTIVE courses

Code	Course Title	Credits	Units
OCH 313	Nuclear Chemistry	10	1
OCH 314	Industrial Organic Chemistry	10	1
OCH 315	Theoretical Chemistry	10	1
OCH 316	Industrial Inorganic Chemistry	10	1
OBL 215**	Biochemistry	10	1
OCH 317	Chemistry Research Project	10	1

*****This Is Will Be Taken From Life Science Department***

Note: All Science Students Must Take One of the Special Projects from One Teaching Subject to Complete the Programme

COURSE STRUCTURE FOR PHYSICS**LEVEL 1****Core courses**

Code	Course Title	Credits	Units
OFC 017	Communication skills	10	1
OCP 100	Computer Studies	10	1
OPH 111	Fundamental Physics	30	3
OPH 113	Mathematical Methods of Physics	20	2
OPH 320A	Physics Practical	*	*
Total		80	8

LEVEL 2**CORE COURSES**

Code	Course Title	Credits	Units
OPH 112	Electromagnetism I & II	20	2
OPH 216	Basic Electronics	10	1
OPH 320B	Physics Practical	*	*
Total		30	3

ELECTIVE Courses

Code	Course Title	Credits	Units
OPH 211	Statistical Thermodynamics	20	2
OPH 213	Optics	20	2
OPH 214	Earth Physics	20	2
OPH 215	Analog Electronics	20	2
Totals		80	8

LEVEL 3**CORE COURSES**

Code	Course Title	Credits	Units
OPH 312	Physics of the atom	20	2
OPH 321	Physics Research Project	20	2
OPH 320C	Physics Practical	*	*
Total		40	4

*OPH 320A, B, C accumulated to 10 credits after completion.

ELECTIVE Courses

Code	course Title	Credits	Units
OPH 311	Fundamentals of Material Science	10	1
OPH 313	Quantum Theory of Solids	20	2
OPH 314	Digital Electronics	20	2
OPH 315	Microelectronics	20	2
OPH 323	Environmental Physics	20	2
Total		90	9

3) Programme Outcomes:

On successful completion of the physical sciences subjects, students should be able to:

- (a) Apply the acquired knowledge in a variety of career opportunities including working in industries, metrological agencies, scientific laboratories, academic institutions and secondary schools as science teachers.
- (b) Explain and interpret correctly all key experimental observations they come across while doing practical/field works, hence becoming true scientists who qualify to either be employed or self-employ in any relevant scientific institution.
- (c) Proceed doing further research in higher degrees programmes if one wishes to do so.

4) Assessment:

The Bachelor of Science with Education programme follows general OUT assessment procedure.

Candidates shall be assessed in the modules for which they have enrolled for each year of study. Within each module candidates shall be assessed by a combination of Main timed test (30%) and annual examination (70%). The pass mark shall be 40 for each assessment element and for the module overall.

The course assessment also includes written reports of practical work with an equivalent weight of 2 units. These are marked out 100% for each module, in which case the scores will be awarded by the teacher responsible for the course and / or practical session. However the overall grade will be determined by the average of the sub grades at each level of study. Therefore the final overall grade will be computed at level three after completing all the practical sessions of all the modules studied.

The coursework also includes written report of project which is done at level three when a student has completed at least two-thirds of the total number of units required for graduation.

C) BACHELOR OF SCIENCE IN ENERGY RESOURCES:

1) Summary of Programme:

Course Name:	Bachelor of Science in Energy Resources
Course Initials:	BSc ER.
Duration:	3-8 years.
Total Units:	38.
Mode of Delivery:	Blended mode of delivery (e-learning).

2) Programme Structure:

Bachelor of Science (Energy Resources) is designed to prepare students for their professional work in Physics in industry, energy sector and physical environment. The Programme contributes to the Faculty's aim of training Scientists in Energy resources. It also contributes to the University's aim to produce Scientists and Technologists in the energy sector. The programme will provide knowledge and understanding of the physical aspects of nature in relation to dynamics and energy relationships and its dynamics with Mathematics to model the processes as well as practical experience in Energy Resources. The programme will also train students in problem solving and entrepreneurship in the related field.

Details of programme structure, showing courses codes, course names and their respective units are given below. It is important to note that all courses that appear as core courses are mandatory and not optional; hence students are supposed to take all core courses in this programme.

Level 1 Core Courses

Course Code	Course Title	Units
OFC 017	Communication skills	1
OCP 100	Computer Studies	1
OPH 111	Fundamental Physics	3
OPH 112	Electromagnetism I and II	2
OPH 211	Statistical Thermodynamics	2
OPH 212	Mathematical Physics	2
OPH 320A	Physics Practical	*

*OPH320A,B,C will accumulate to 10 credits after completion

Level 1 Elective Courses

Course Code	Course Title	Units
OMT 111	Mathematical Analysis	2
OMT 114	Probability and Statistics	2

Level 2 Core Courses

Course Code	Course Title	Units
OMT 223	Computer Programming	1
OPH 213	Optics	2

OPH 214	Earth Physics	2
OPH 311	Fundamentals of Material Science	1
OPH 312	Physics of the Atom	2
OPH 313	Quantum Theory of Solids	2
OPH 314	Digital Electronics	2
OPH 320B	Physics Practical	*

*OPH320A,B,C will accumulate to 10 credits after completion

Level 2 Elective Courses

Course Code	Course Title	Units
OMT 221	Numerical Methods	1
OPH 215	Analog Electronics	2

Level 3 Core Courses

Course Code	Course Title	Units
OPH 322	Solar Energy	2
OPH 323	Environmental Physics	2
OPH 324	Wind Energy	2
OPH 325	Nuclear Energy	2
OPH 326	Non-conversional Energies	2
OPH 330	Energy Resources Practical	1
OPH 331	Energy Resources Final Project	1
OPH 320C	Physics Practical	*

*OPH320A,B,C will accumulate to 10 credits after completion

Level 3 Elective Courses

Course Code	Course Title	Units
OME 312	Entrepreneurship course	2

3) Programme Outcomes:

After completing this programme the student should be able to work as a technologist in industry, do research in Energy Resources and related disciplines:

4) Assessment:

The Bachelor of Science with Education programme follows general OUT assessment procedure.

Candidates shall be assessed in the modules for which they have enrolled for each year of study. Within each module candidates shall be assessed by a combination of Main timed test (30%) and annual examination (70%). The pass mark shall be 40 for each assessment element and for the module overall.

The course assessment also includes written reports of practical work with an equivalent weight of 2 units. These are marked out 100% for each module, in which case the scores will be awarded by the teacher responsible for the course and / or practical session. However the overall grade will be determined by the average of the sub grades at each level of study. Therefore the

final overall grade will be computed at level three after completing all the practical sessions of all the modules studied.

The coursework also includes written report of project which is done at level three when a student has completed at least two-thirds of the total number of units required for graduation.

D) STAFF CONTACTS:

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