Republic of Iraq
Ministry of Higher Education & Scientific Research
Supervision and Scientific Evaluation Directorate
Quality Assurance and Academic Accreditation

Academic Program Specification Form For The Academic

University: *Anbar*
College: *Education for Pure Science*
Department: *Mathematics*
Date of Form Completion: *10/6/2023*

Prof. Dr. Abdul Rahman Salman. Juma	**Assist. Prof. Dr. Harith Kamil Buniya**	**Dr. Mohammed Yousif Turki**
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Quality Assurance And University Performance Manager

Date : / /
Signature

TEMPLATE FOR PROGRAMME SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

PROGRAMME SPECIFICATION

This Programme Specification provides a concise summary of the main features of the programme and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It is supported by a specification for each course that contributes to the programmer.

1. Teaching Institution	University of Anbar
2. University Department	College of education for pure science- Mathematics
3. Programmer Title	Education Mathematic Sciences
4. Title of Final Award	Master of Education Mathematic Sciences
5. Modes of Attendance offered	Quarterly
6. Accreditation	Nothing
7. Other external influences	University application - practical graduation research projects
8. Date of production	1/9/2023
9. Aims of the Programmer	
1. Achieving the specified standards for the quality of material, human, technical and financial resources.	
2. Providing an efficient administrative staff that knows its duties and powers according to the work structures and regulations, in which the requirements of the job description are fulfilled**.**	
3. Providing a specialized teaching staff who is fluent in using modern techniques and methods in education with good job satisfaction.	
4. Preparing academic programs in accordance with international academic standards and providing their knowledge, training and technical requirements.	
5. Preparing students with scientific, practical and educational knowledge that meets the needs of the labor market.	
6. Paying attention to scientific research in terms of laboratory, research and researcher in order to achieve a distinguished research reputation locally and globally.	
7. Research and professional openness to community institutions to meet their needs and aspirations.	
8. Evaluate all individuals and processes to ensure quality performance and continuous improvement.	

10. Learning Outcomes, Teaching, Learning and Assessment Methods

A1. Knowledge and Understanding

A1. Enable the graduate student to acquire theoretical knowledge of Mathematics.
A2. Empowering the graduate student how to teach and ways of communicating scientific information to grudaute students.
A3. The student's knowledge of the methods of measurement and evaluation and methods of modern teaching methods in Mathematics.
A4. The graduate student is acquainted with the educational material by providing it electronically in the virtual classroom. In addition to enabling the student to know the learning theories related to the ages of students for the secondary school stage.

B. Subject-specific skills

B1. Gaining knowledge and enriching the student with the methods of laboratory work.
B2. Orienting the student to the scientific method in solving all scientific problems.
B3. Knowing the objectives and origins of the art of teaching chemistry.
B4. Enabling students to acquire the skills of using virtual classrooms

Teaching and Learning Methods

1. The method of listening and thinking deeply in order to understand the problem to solve it.
2. The method of scientific discussion and meaningful dialogue.
3. Adopting the method of monthly and final exams and submitting weekly reports.

Assessment methods

1. The treatment method using final scores.
2. Random and surprise tests.
3. Teaching tasks in the virtual classroom.

C. Thinking Skills

C1. Adopting the method of dialogue between the student and the professor.
C2. Interest in research projects and preparing organized reports
C3. Adopt the method of discussion. (Performance tests and seminars).
C4. Adopting e-learning to provide an interesting and flexible learning environment.

Teaching and Learning Methods

1. Method of application in research laboratories
2. Adopting the method of constructive dialogue and discussion
3. Adopt the trial-and-error method.
4. The adoption of multimedia in the virtual classes (image, text, audio, video)

Assessment methods
1. Preparation of the seminar (graduation research) 2. Adoption of the grading method as a basis in the evaluation process. 3. Adoption of the test method. 4. Adopting the method of discussions and dialogues between the students and the professor. 5. Create a test task in the virtual classes.
D. General and Transferable Skills (other skills relevant to employability and personal development) D1- That the student benefit from his learning and embody this in his personal and professional development. D2- That the student is able to employ the knowledge he receives during the study stage. D3- That the student benefit from theoretical knowledge in employing the teaching profession and mastering it in a concept-based manner. Fundamentals of teaching chemistry. D4 - Skills of modern technologies in communication, documentation and communication.
Teaching and Learning Methods
1. Field visits in laboratories. 2. Scientific application in laboratories. 3. Take advantage of graduation research. 4. Presentation and presentation of educational content in virtual classes using multimedia (video, recorded lecture).
Assessment Methods
1. Articles and periodical research 2. The interview 3. Final exams 4. Determining study tasks and duties periodically and regularly in the virtual classroom

11. Programmer Structure				
Level/ Year	Course or Module Code	Course or ModuleTitle	Weekly hours	
			Lec.	Lab.
Attending (First + Second) Class	MAT501	Advanced Complex Analysis	2	-
	MAT502	Advanced Ring Algebra	2	-
	MAT503	Advanced Mathematical Statistics	2	-
	MAT504	Advanced Numerical Analysis	2	-
	MAT505	Advanced Functional Analysis	2	-
	MAT506	Advanced Partial Definitional Equations	2	-
	MAT507	Advanced Module Theorem	2	-
	MAT508	Options class	2	-
	MAT509	Advance Computer	2	-
	MAT510	English language	2	-
	MAT511	Scientific Research methodology	2	-
	MAT512	Teaching Theorem	2	-
	MAT513	Seminar	2	-
	MAT514	Technological Information	2	-
Research class	MAT201	Thesis Project	4	-

13. Personal Development Planning

1. Using modern scientific sources.
2. Using rapid communication networks to transfer information such as the Internet.
3. Visits and practical practices in service laboratories.
4. Acquisition of scientific and modern experiences and skills in the field of modern technical communication

14. Admission criteria

1. Admission according to the general and central average system.
2. Admission to departments is according to the student's desire and is modified.
3. It is a condition for a graduate of the preparatory school and the scientific stream exclusively.
4. The accepted graduate student's personal and mental integrity and freedom from physical impairments

15. Key sources of information about the programmer

1. Curriculum books approved by the Sectorial Committee of the Faculties of Education for Pure Sciences.
2. Helping books.
3. Books and archaeological resources / sources in the English language.
4. Additional sources from the Internet.
5. The training courses held by the university on e-learning platforms.

Curriculum Skills Map

				Programmer Learning Outcomes															
Year / Level	Course Code	CourseTitle	Core (C) or Option(O)	Knowledge and understanding				Subject-specific skills				Thinking Skills				General and Transferable Skills (or) Other skills relevant to employability and personal development			
				A1	**A2**	**A3**	**A4**	**B1**	**B2**	**B3**	**B4**	**C1**	**C2**	**C3**	**C4**	**D1**	**D2**	**D3**	**D4**
Attending (First +Second)	MAT501	Advanced Complex Analysis	Core	√	√	√		√	√			√	√			√	√	√	√
	MAT502	Advanced Ring Algebra	Core	√		√		√	√			√				√			
	MAT503	Advanced Mathematical Statistics	Core	√		√		√	√			√				√			
	MAT504	Advanced Numerical Analysis	Core	√		√		√	√			√				√			
	MAT505	Advanced Functional Analysis	Core	√		√		√	√			√				√			
	MAT506	Advanced Partial Definitional Equations	Core	√		√		√	√			√				√			
	MAT507	Advanced Module Theorem	Core	√		√		√	√			√				√			
	MAT508	Options class	Core	√		√		√	√			√				√			
	MAT509	Advance Computer	Core	√		√		√	√			√				√			
	MAT510	English language	Core	√		√		√	√			√				√			
	MAT511	Scientific Research methodology	Core			√		√	√			√				√			
	MAT512	Teaching Theorem	Core			√		√	√			√				√			
	MAT513	Seminar	Core			√		√	√			√				√			
	MAT514	Technological Information	Core			√		√	√			√				√			

Curriculum Skills Map																		
				Programmer Learning Outcomes														
Year / Level	Course Code	CourseTitle	Core (C) or Option(O)	Knowledge and understanding				Subject-specific skills				Thinking Skills				General and Transferable Skills (or) Other skills relevant to employability and personal development			
				A1	**A2**	**A3**	**A4**	**B1**	**B2**	**B3**	**B4**	**C1**	**C2**	**C3**	**C4**	**D1**	**D2**	**D3**	**D4**
Second Year Researcher	**MAT515**	Thesis Project	Core	√		√		√	√			√				√			

Course description Sample

Reviewing the performance of higher education institutions ((academic program review))

This course description provides a succinct summary of the most important course characteristics and the learning outcomes the student is expected to achieve Demonstrating whether they have made the most of the learning opportunities available. It must be linked to a description the program.

Educational institution	**Anbar University - College of Education for Pure Sciences**
University department/center	**College of Education for Pure Sciences/Department of Mathematics**
Course name/code	**Advanced Mathematical Statistics - \MAT503**
Programs in which it is included	**Master of Mathematics**
Available attendance forms	**Daily**
Semester/year	**Quarterly**
Number of study hours (total)	**30**
Date this description was prepared	**2023-2024**
Course objectives:	
1- For students to become familiar with the types of Advanced Mathematical Statistics. 2- Transferring from the description stage to the decision-making stage and logical interpretation of the results. 3- The course is concerned with studying an introduction to estimation theory (by point or by period) and how to obtain it. 4-The concept of hypothesis testing, some probability distributions, sampling distribution theory, finding the critical region, optimal test power, and the Neyman-Pearson theorem.	
5-Informing students about Mathematical Statistics, and to show students the most important applications of mathematical statistics.	

Learning outcomes, teaching, learning and assessment methods

A- Knowledge and understanding

A1- Knowledge of the topics on which understanding of the course depends (functions, differentiation, integration (especially integral by division), exponential functions, logarithm concepts, double integration, and famous series).

A2- Knowing the foundations and basic concepts of probability and statistics in mathematics, the type of distribution required that is appropriate for the data, and choosing the appropriate method to find its characteristics.

A3- Knowing the foundations and methods of establishing the estimator and how to estimate its two types, point and period.

A4- Bringing the student to a level where he has the ability to interpret the results (research) and turn them into a work reality, from which he will benefit in the future during study and after graduation .

Teaching and learning methods

Blackboard + pen + data show

B- Subject-specific skills

B1 - Developing the student's mathematical and statistical skills and preparing him scientifically to be a successful statistician.
B2 - Developing the skill of estimation, hypothesis testing, and statistical analysis as functions of the statistical analyst.
B3 - Developing the student's decision-making skill as it is the essence of the educational and statistical process.

C- Thinking skills
External tests 2- Various and interconnected questions to test the student's skills

Teaching and learning methods

Blackboard + Pen + data show +Electronically on some e-learning programs such as Google Form and other forms+ Extrapolation, Analysis+ Conclusion+ The lecture Empowerment+ Discussion.

Evaluation methods

Daily and monthly examination

General and transferable skills (other skills related to employability and personal development

Course structure					
Evaluation method	**Teaching method**	**Name of the unit/course or subject**	**Required learning outcomes**	**hours**	**The week**
Attendance and motivational questions.	**A video lecture with a text lecture with a live broadcast**	**Chapter One : Statistics and Sampling Distributions (Two weeks)** Conditional Expectation Sufficiency Exponential Families. Convex Loss Function	The student learns the basic principles of probability distributions and reviews them	2	1
Exams and daily activities	**A video lecture with a text lecture with a live broadcast**	Model specification 1- Two kinds of inference problems (Point estimation, Hypothesis testing) 2- Statistics 3- Sampling distributions (Basics, Asymptotic results, Two numerical approximations)	The student learns non-parametric distributions such as chi-square, chi-square, and chi-square	2	2
Exams and daily activities	**A video lecture with a text lecture with a live broadcast**	**Point Estimation Basics (one weeks) Chapter 2. Unbiasedness** Properties of estimators: Unbiasedness, Consistency, Mean-square error UMVU estimators. Non-parametric families The Information Inequality Multiparameter Case Where do estimators	The student will learn methods of inference for the distribution function of random variables (cumulative function).	2	3

		come from?			
Exams and daily activities	**A video lecture with a text lecture with a live broadcast**	**Likelihood and Maximum Likelihood Estimation (Two weeks)** Basic properties 1- Invariance 2- Consistency	The student will learn to deduce distributions using the function generating the moments	2	4
Attendance and motivational questions	**A video lecture with a text lecture with a live broadcast**	Fisher information and the Cramer – Rao bound, Efficiency and asymptotic normality Estimation of the Fisher information Confidence intervals Sufficiency Neyman{Fisher factorization theorem	The student will learn to derive distributions using the transformation method	2	5
Attendance and motivational questions	**A video lecture with a text lecture with a live broadcast**	**Sufficiently and Minimum variance unbiased estimators (Two weeks)** Rao – Blackwell theorem Completeness and Lehmann – Scheffe theorem Exponential families Multi-parameter cases Minimal sufficiency and ancillary Rao – Blackwell as a complete-class theorem Proof of Lehmann – Scheffe Theorem Connection between sufficiency and conditioning **Chapter Three: Hypothesis Testing (Two weeks)** Motivation and Basics Definitions Most powerful tests Neyman – Pearson lemma	The student will learn the concept of sampling and restricted distributions	2	6

		Uniformly most powerful tests Likelihood ratio tests 1. Motivation and setup 2. One-parameter problems 3. Multi-parameter problems Likelihood ratio confidence intervals **Chapter 4. Average-Risk Optimality :Bayesian Statistics (Two weeks)** Bayes Estimation Minimax Estimation Minimaxity and Admissibility in Exponential families Shrinkage Estimators and Bigdata Mechanics of Bayesian analysis Bayes theorem and the posterior distribution Bayesian inference Choice of prior Elicitation from experts Convenient priors Non-informative priors Other important points Hierarchical models Complete-class theorems Computation Asymptotic theory **Chapter 5. Large Sample Theory** Convergence in Probability and Order in Probability Convergence in Distribution Asymptotic Comparisons (Pitman Efficiency)			

		M-Estimation Theory Example: AREs of Mean, Median, Trimmed Mean **Chapter 6. Maximum Likelihood Estimation** Consistency Asymptotic Normality of the MLE Asymptotic			
Attendance and motivational questions	**A video lecture with a text lecture with a live broadcast**	Optimality of the MLE Asymptotic Efficiency of Bayes Estimators	The student understands the theory of sampling of a natural population and sampling distributions	2	7
Attendance and motivational questions	**A video lecture with a text lecture with a live broadcast**	Discussion: MLE vs. Shrinkage (Efron & Hastie, 2016)	The student will be familiar with ordered statistics and the distributions of their functions	2	8
Attendance and motivational questions with grade	**A video lecture with a text lecture with a live broadcast**	**Chapter 7. Optimal Testing Theory** Uniformly Most Powerful (UMP) Tests The Neyman-Pearson Lemma P-Values	The student learns how to do a comprehensive review of the subject, and the student notices the extent of his understanding of what has been studied by taking the first month's exam.	2	9
Attendance and motivational questions	**A video lecture with a text lecture with a live broadcast**	Monotone Likelihood Ratio Confidence Bounds Uniformly Most	The student will learn the concept of estimation theory, the estimator and its properties	2	10
Attendance and motivational questions	**A video lecture with a text lecture with a live broadcast**	Powerful Unbiased (UMPU) Tests Likelihood Ratio (LR), Wald, and Score Tests	The student will learn the concept of an unbiased and least variable estimator	2	11
Attendance and motivational questions	**A video lecture with a text lecture with a live broadcast**	**What else can you learn? (Two weeks)** 1. Sampling and experimental design. 2. Non-iid models 3. High-dimensional	The student will learn the concept of methods for establishing estimators (maximum potential function and moment method).	2	12

		models 4. Nonparametric models 5. Advanced asymptotic theory 6. Computational methods Foundations of statistics			
Attendance and motivational questions	**A video lecture with a text lecture with a live broadcast**	Solve the questions and assignments that have been given	The student learns how to know what has been studied	2	13
Attendance and motivational questions with grade	**A video lecture with a text lecture with a live broadcast**	A comprehensive review of the material with the second month exam	To increase the student's awareness through enriching examples and questions	2	14
person written questions	a video lecture, a text lecture, a live broadcast.	The final assessment	The student learns the extent of his understanding of the material through a comprehensive review	2	15

1- Developing curricula by continuously keeping pace with the development taking place in the academic programs of the corresponding departments in international universities in the nature of the academic subjects that meet the need and the extent to which they cover the requirements of the productive and academic activities of the beneficiaries.
2- Work to enhance the student's self-confidence by focusing on positive behaviors and effective contributions to building a personality that is aware of its role in developing society and capable of carrying scientific and moral integrity in their professional lives.
3- Ensuring the exchange of experiences and visits made by the teaching staff to universities and colleges outside Iraq play a helpful role in formulating curricula to serve the development of the educational process.

<table>
<tr><td colspan="2">Infrastructure</td></tr>
<tr><td>

Introduction in Mathematical Statistics., Hogg, R. , McKean, J. and Craig, A., , Pearson Education , USA.
Probability and Statistical Inference, Hogg, R. , Tanis, E., and Zimmerman, D., Pearson Education , USA.
Mathematical Statistics with Applications, Dennis D. Wackerly, William Mendenhall III and Richard L. Scheaffer, SEVENTH EDITION, 2008, USA

</td><td>Required readings:

1-Course books

2-Other</td></tr>
<tr><td>Bibliography
[1] Y. Benjamini and Y. Hochberg (1995). Controlling the false discovery rate: A practical and powerful
approach to multiple testing. J. Roy. Statist. Soc. Ser. B, 57, 289–300.
[2] P. Billingsley (1995). Probability and Measure, 3rd Edition. Wiley.
[3] P.J. Bickell and K.A. Doksum (2015). Mathematical Statistics (Vol. 1), 2nd Edition. CRC Press.
[4] P.J. Brockwell and R.A. Davis (1991). Time Series: Theory and Methods, 2nd Edition. Springer.
[5] B. Efron (2010). Large-Scale Inference: Empirical Bayes Methods for Estimation, Testing and Prediction. Cambridge.
[6] B. Efron and T. Hastie (2016). Computer Age Statistical Inference: Algorithms, Evidence, and Data
Science. Cambridge.
[7] F.A. Graybill and R.B. Deal (1959). Combining unbiased estimators. Biometrics, 15, 543–550.
[8] W. James and C. Stein (1961). Estimation with quadratic loss. Proc. 4th Berkeley
Symp. Math. Statist. Prob., 1. Berkeley: University of California Press.
[9] E.L. Lehmann and G. Casella (1998). Theory of Point Estimation, 2nd Edition. Springer.
[10] E.L. Lehmann and J.P. Romano (2005). Testing Statistical Hypotheses, 3rd Edition. Springer.
[11] M.J. Schervish (1995). Theory of Statistics. Springer.
[12] R.J. Serfling (1980). Approximation Theorems of Mathematical Statistics. Wiley.
[13] T.A. Severini (2000). Likelihood Methods in Statistics. Oxford.
[14] A. Van der Vaart (1998). Asymptotic Statistics. Cambridge.</td><td>Special requirements</td></tr>
<tr><td>Graduation research projects</td><td>Social services (including, for example, guest lectures, vocational training, and field studies(</td></tr>
</table>

Admissions	
1. Approval of admission conditions for students in accordance with the regulations of the Ministry of Higher Education and Scientific Research (admission to graduate studies is by university order from the university presidency) **2. To pass the department's personal examination.** **3. Bachelor's average to obtain a master's degree, and bachelor's and master's averages to obtain a doctoral degree.** **4. The department's capacity includes postgraduate students in general, private, and privileges channels.**	**Prerequisites**
4	**The smallest number of gradute students**
15 - 5	**The largest number of graduate students**

Course description Sample

Reviewing the performance of higher education institutions ((academic program review((

This course description provides a succinct summary of the most important course characteristics and the learning outcomes the student is expected to achieve Demonstrating whether they have made the most of the learning opportunities available. It must be linked to a description the program.

- Educational institution1	**Anbar University - College of Education for Pure Sciences**
University department/center	**College of Education for Pure Sciences/Department of Mathematics**
Course name/code	**Relaiability Theorem \MAT509**
Programs in which it is included	**Master of Mathematics**
Available attendance forms	**Daily**
Semester/year	**Quarterly**
Number of study hours (total)	**30**
Date this description was prepared	**2023-2024**
Course objectives:	
This course aims to develop students' skills with regard to the subject of analyzing the reliability of machines and the amount of time to reach a machine failure state, and to learn about the probability distributions related to failure models, as well as to learn about systems and their types, and how to calculate their reliability, and then study methods for estimating reliability, and finally learn how to calculate Maintenance time.	
3-Informing students about Relaiability, and to show the graduate students the most important applications of survival analysis.	

Learning outcomes, teaching, learning and assessment methods
A- Knowledge and understanding
A1- Knowledge of the topics on which understanding of the course depends

(functions, differentiation, integration (especially integral by division), exponential functions, logarithm concepts, double integration, and famous series.

A2- Knowing the foundations and basic concepts of probability and statistics in mathematics, the type of distribution required that is appropriate for the data, and choosing the appropriate method to find its characteristics.

A3- Knowing the foundations and methods of establishing the estimator and how to estimate its two types, point and period.

A4- Bringing the student to a level where he has the ability to interpret the results (research) and turn them into a work reality, from which he will benefit in the future during study and after graduation.

Teaching and learning methods
Blackboard + pen + data show
B- Subject-specific skills
B1 - Developing the student's mathematical and statistical skills and preparing him scientifically to be a successful statistician. B2 - Developing the skill of estimation, hypothesis testing, and statistical analysis as functions of the statistical analyst. B3 - Developing the student's decision-making skill as it is the essence of the educational and statistical process.
C- Thinking skills External tests 2- Various and interconnected questions to test the student's skills
Teaching and learning methods
Blackboard + pen + data show +Electronically on some e-learning programs such as Google Form and other forms+ Extrapolation, Analysis+ Conclusion+ The lecture Empowerment+ Discussion.
Evaluation methods
Daily and monthly examinations
General and transferable skills (other skills related to employability and personal development.

Course structure					
Evaluation method	Teaching method	Name of the unit/course or subject	Required learning outcomes	hours	The week
Attendance and motivational questions.	A video lecture with a text lecture with a live broadcast	Introduction and Overview	The student to learn the basic principles of estimation theory	2	-
Exams and daily activities	A video lecture with a text lecture with a live broadcast	Reliability function	The student learns confidence intervals for the mean or variance of a normal population	2	-
Exams and daily activities	A video lecture with a text lecture with a live broadcast	Time to Failure Distribution (Some Well – Known Failure Model)	The student will learn an introduction to hypothesis testing	2	-
Exams and daily activities	A video lecture with a text lecture with a live broadcast	Exponential Failure Model	The student learns to extract the critical region and test the hypothesis	2	-
Attendance and motivational questions	A video lecture with a text lecture with a live broadcast	Gamma Failure Model	The student learns to infer errors of the first and second types	2	-
Attendance and motivational questions	A video lecture with a text lecture with a live broadcast	Weibull Failure Model	The student learns the concept of optimal tests That the student realizes which test is more robust or regular	2	-
Attendance and motivational questions	A video lecture with a text lecture with a live broadcast	Log – normal Failure Model	The student should know the Neyman-Pearson theorem	2	-
Attendance and motivational questions	A video lecture with a text lecture with a live broadcast	Reliability of System	The student learns how to do a comprehensive review of the subject, and the student notices the extent of his understanding of what has been studied by taking the first month's exam.	2	-
Attendance and motivational questions with grade	A video lecture with a text lecture with a live broadcast	K- out of - n system	The student will learn the concept of Bayesian statistics	2	-
Attendance and motivational questions	A video lecture with a text lecture	Mean Life and Reliability Estimation	The student will learn the concept of test power	2	-

	with a live broadcast				
Attendance and motivational questions	A video lecture with a text lecture with a live broadcast	Estimation with Complete samples	The student learns the Chi-square quality tests	2	-
Attendance and motivational questions	A video lecture with a text lecture with a live broadcast	Estimation with Censored samples	The student learns how to know what has been studied	2	-
Attendance and motivational questions	A video lecture with a text lecture with a live broadcast	Design for Maintainability	To increase the student's awareness through enriching examples and questions With an assessment exam	2	-
Attendance and motivational questions with grade	A video lecture with a text lecture with a live broadcast	Maintainability Design Features	The student learns the extent of his understanding of the material through a comprehensive review	2	-
		Bath – tub Curve			

Admissions	
1. Approval of admission conditions for students in accordance with the regulations of the Ministry of Higher Education and Scientific Research (admission to graduate studies is by university order from the university presidency) **2. To pass the department's personal examination.** **3. Bachelor's average to obtain a master's degree, and bachelor's and master's averages to obtain a doctoral degree.** **4. The department's capacity includes postgraduate students in general, private, and privileges channels.**	**Prerequisites**
4	**The smallest number of gradute students**
15 - 5	**The largest number of graduate students**

Graduation research projects	**Social services (including, for example, guest lectures, vocational training, and field studies(**

Infrastructure	
Ebeling; C. E. "**An Introduction to Reliability and Maintainability Engineering**"; 2009	Required readings: 1-Course books 2-Other
Al – Nasser; Abdul Majeed "**Statistical Reliability**", 2009 Rausand; R. " **System Reliability theory: Models, Statistical Methods, and Applications**"; 2004	Special requirements
1- Barlow , R, E., and Prochain, F. "Mathematical Theory of Reliability " , John Wiley, 1990. 2- Ebeling , C.E. "An introduction to Reliability Engineering and Maintainability". The McGraw – Hill companies, INC,1997. 3- Jardin , A,K,S, "Maintenance, Replacement, and Reliability", Pitman Publishing Corporation , 1986. 4- Lawless, J.F. "Statistical Models and Methods for life time Data", John Wiley , 2003. 5- Lewis, E.E. "Introduction to Reliability Engineering", John Wiley , 1997. 6- Sinha, S.K., "Life testing and Reliability Estimation", Wiley Eastern Limited, 1986. 7- Smith ,D.J>,"Reliability m Maintainability and Risk", Butter Worth Heinemann, Oxford, 1993. 8- Mecker, W.Q., and Escobar, L.A., "Statistical methods for Reliability Data", A Wiley – Intercience Publication, John Wiley and Sons, INC, 1998. 9- Bassu, A.P.," Estimate of Reliability for some distribution useful in life testing", Technometric, Vol.6, No.2, P.P. 2-5. 10- Zacksm S., and Even, M. " The efficiencies in small samples of the maximum likelihood and best unbiased estimators of Reliability function, JASA, Vol.61, P.P. 1033 - 1051 . 11- Kapus,K.C., and Lamberson, L.l., "Reliability in Engineering Design", John Wiley and Sons, New York, p.p.8 – 20. 12- ausand, M. and Hayland, A., "System Reliability Theory Models, Statistical Methods", John Wiley and Sons,, New York, NTNUm 2004. 13- Wolstenholms, L.C. "Reliability Modeling , A Statistical Approach", Chapman For Hall, 1999. 14- Lecmis, L.M." Reliability Probabilistic Models & Statistical Methods", Prentice 2nd Edition, 2003. 15- IEEE Transaction on Reliability. 16- Operatinal Research Society. 17- The Annals of mathematical Statistics. 18- Technometrics.	Social services (including, for example, guest lectures, vocational training, and field studies(

Course description Sample

Reviewing the performance of higher education institutions academic program review

This course description provides a succinct summary of the most important course characteristics and the learning outcomes the student is expected to achieve Demonstrating whether they have made the most of the learning opportunities available. It must be linked to a description the program.

Educational institution	**Anbar University - College of Education for Pure Sciences**
University department/center	**College of Education for Pure Sciences/Department of Mathematics**
Course name/code	**Advanced Complex Analysis-1 \MAT501**
Programs in which it is included	**Master of Mathematics**
Available attendance forms	**Daily**
Semester/year	**Quarterly**
Number of study hours (total)	**30**
Date this description was prepared	**2023-2024**
Course objectives:	
1- Emphasizing the importance of the topic of advanced complex analysis in relation to other sciences.. 2- For gradute students to become familiar with the types of advanced complex analysis	
3-Informing students about advanced complex analysis, the axioms of sub ordinate , and advanced complex analysis spaces.	
4-To show students the most important applications of advanced complex analysis	

Learning outcomes, teaching, learning and assessment methods
A- Knowledge and understanding 1-That the grudute student understands what is meant by advanced complex analysis 2-The student should distinguish between types of advanced complex analysis 3-For the student to recognize the relationship between continuous functions and isomorphism 4-For the student to become familiar with the types of complex number axioms

5-For the student to become familiar with the concept ofcomplex and compact spaces and interconnected spaces and their applications
Teaching and learning methods
Blackboard + pen + data show
B- Subject-specific skills
1-That the student can distinguish between different **advanced complex analysis** 2-That the student can distinguish between continuous, open, and closed functions. 3-That the student can distinguish between the axioms of separation and reach the relationships between these spaces 4-The student must have the necessary skill to solve problems using basic concepts. 5-That the student is able to understand compact and interconnected spaces and their connections to other spaces
C- Thinking skills External tests 2- Various and interconnected questions to test the student's skills
Teaching and learning methods
Blackboard + pen + data show
Evaluation methods
Daily and monthly examinations
General and transferable skills (other skills related to employability and personal development(

Course structure					
Evaluation method	**Teaching method**	**Name of the unit/course or subject**	**Required learning outcomes**	**hours**	**The week**
Exams and daily activities		**Development of definitions and concepts of complex numbers And operations on complex numbers Some research developments into the properties of complex chaperones Algebraic properties The absolute value of a complex number Definition: The modulus or absolute value of a complex number Geometric representation of advanced complex numbers Polar coordinates Development of de Mouvre's theory Developments and modifications in Euler's formula Full review Research aspects are in continuity Derivatives Differentiation formulas Cauchy-Riemann equations in polar forms Some modifications and developments in the analytical function Some modifications and developments in the harmonic function Solve the questions and assignments that have been given Comprehensive review of the material with a semi-final exam A report on a special topic in the article Discussing research reports in advanced decade settings**	**Understand the prescribed material correctly and know its applications**	**2**	**-**

Infrastructure	
1- سمير بشير حديد، الدوال المعقدة، طبع بمطابع مديرية دارالكتب للطباعة والنشر\جامعة الموصل ،1980. 2- جي.براون، المتغيرات المعقدة وتطبيقاتها، مديرية مطبعة الجامعة\الموصل،1983.	Required readings: 1-Course books 2-Other
1- R. V. Churchill, J. W. Brown and R. F. Verhey, "Complex Variables and Applications," 3rd Edition, McGraw Hill, New York, 1976. 2- S. Ponnusamy, Herb Silverman, Complex Variables with Applications, Birkhäuser Boston, MA, USA, 2006.	**Special requirements**
Ponnusamy, Herb Silverman, Complex Variables with Applications, Birkhäuser Boston, MA, USA, 2006.	**Social services (including, for example, guest lectures, vocational training, and field studies(**

Admissions	
Central admission and academic department plan	**Prerequisites**
4	**The smallest number of students**
15-5	**The largest number of students**

Course description Sample

Reviewing the performance of higher education institutions academic program review

This course description provides a succinct summary of the most important course characteristics and the learning outcomes the student is expected to achieve Demonstrating whether they have made the most of the learning opportunities available. It must be linked to a description the program.

Educational institution	**Anbar University - College of Education for Pure Sciences**
University department/center	**College of Education for Pure Sciences/Department of Mathematics**
Course name/code	**Advanced Modules MAT507**
Programs in which it is included	**Master of Mathematics**
Available attendance forms	**Daily**
Semester/year	**Quarterly**
Number of study hours (total)	**30**
Date this description was prepared	2023/2/10
Course objectives:	
1- Emphasizing the importance of the topic of advanced module in relation to other sciences.. 2- For gradute students to become familiar with the types of advanced modules	
3-Informing students about advanced modules, the types of modules.	
4-To show students the most important applications of advanced modules	

Learning outcomes, teaching, learning and assessment methods
A- Knowledge and understanding 1-That the graduate student understands what is meant by advanced modules 2-The student should distinguish between types of advanced modules 3-For the student to recognize the relationship between three theorems of isomorphism 4-For the student to become familiar with the types of modules 5-For the student to become familiar with the concept of module and commutative group and their applications
Teaching and learning methods

Blackboard + pen + data show
B- Subject-specific skills
1-That the student can distinguish between different **advanced modules** 2-That the student can distinguish between simple modules, and cyclic module 3-That the student can distinguish between the projective and injective modules 4-The student must have the necessary skill to solve problems using basic concepts. 5-That the student is able to understand modules and their submodules
C- Thinking skills External tests 2- Various and interconnected questions to test the student's skills
Teaching and learning methods
Blackboard + pen + data show
Evaluation methods
Daily and monthly examinations
General and transferable skills (other skills related to employability and personal development(

Course structure					
Evaluation method	**Teaching method**	**Name of the unit/course or subject**	**Required learning outcomes**	**hours**	**The week**
Exams and daily activities		**Development of definitions and concepts of modules And operations submodules** **Some research developments into the properties of modules** **Maximal submodules** **Minimal submodule** **Cyclic modules** **Finitely generated module** **Indecomposable modules** **Relative submodule** **Essential submodules** **Free modules** **Projective modules** **Injective modules** **Solve the questions and assignments that have been given** **Comprehensive review of the material with a semi-final exam** **A report on a special topic in the article** **Discussing research reports in advanced decade settings**	**Understand the prescribed material correctly and know its applications**	**2**	**-**

Infrastructure	
1- A First Course in Abstract Algebra By J.B.F.raleigh. 2- Foundation in ring theory : by Wisbaur .p.	Required readings: 1-Course books 2-Other
3- A First Course in Abstract Algebra By J.B.F.raleigh.. 4- Introduction to module theory: by F. Kasch, 1982..	**Special requirements**
Introduction to module theory: by F. Kasch, 1982..	**Social services (including, for example, guest lectures, vocational training, and field studies(**

Admissions	
Central admission and academic department plan	**Prerequisites**
4	**The smallest number of students**
15-5	**The largest number of students**

Course description form

Reviewing the performance of higher education ((institutions academic program review))

This course description provides a succinct summary of the most important course characteristics and the learning outcomes the student is expected to achieve
Demonstrating whether they have made the most of the learning opportunities available. It must be linked to a description .the program.

1. Educational institution	**College of Education for Pure Sciences - Anbar University**
2. University department/center	**Mathematics department**
3. Course name/code	**Advance Functional Analysis / MAT 505**
4. The programs he participates in	**Bachelor's**
5. Available forms of attendance	**Through classrooms**
6. Semester/year	**quarterly**
7. Number of study hours (total)	**2 * 15 = 30 hours, where 2 hours per week**
8. Date this description was prepared	**2024-1-7**
9:Course objectives **Advance functional analysis aims to increase the knowledge of Postgraduate/Master's students in the Department of Mathematics regarding mathematics topics** **Purely, which relies on previous topics such as linear traction and mathematical analysis, and opens horizons for students** **Knowledge of types of spaces and their related applications**	

A- Knowledge and understanding

A1- Knowledge of the topics on which understanding of the course depends (Linear spaces, metric spaces, inner product spaces and Hilbert space.

A2- Knowing the foundations and basic concepts of functional analysis advanced in mathematics and appropriate method to find its characteristics.

A3- Knowing the foundations and methods of establishing the estimator and how to estimate its two types, point and period.

A4- Bringing the student to a level where he has the ability to interpret the results (research) and turn them into a work reality, from which he will benefit in the future during study and after graduation.

Teaching and learning methods

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B- Subject-specific skills

B1 - Developing the student's mathematical and statistical skills and preparing him scientifically to be a successful statistician.
B2 - Developing the skill of estimation, hypothesis testing, and statistical analysis as functions of the statistical analyst.
B3 - Developing the student's decision-making skill as it is the essence of the educational and statistical process.

C- Thinking skills

External tests 2- Various and interconnected questions to test the student's skills

Teaching and learning methods

Blackboard + pen + data show +Electronically on some e-learning programs such as Google Form and other forms+ Extrapolation, Analysis+ Conclusion+ The lecture Empowerment+ Discussion.

Evaluation methods

Daily and monthly examinations

General and transferable skills (other skills related to employability and personal development.

A- Knowledge and understanding

A1- Knowledge of the topics on which understanding of the course depends (functions, differentiation, integration (especially integral by division), exponential functions, logarithm concepts, double integration, and famous series.

A2- Knowing the foundations and basic concepts of probability and statistics in mathematics, the type of distribution required that is appropriate for the data, and choosing the appropriate method to find its characteristics.

A3- Knowing the foundations and methods of establishing the estimator and how to estimate its two types, point and period.

A4- Bringing the student to a level where he has the ability to interpret the results (research) and turn them into a work reality, from which he will benefit in the future during study and after graduation.

Teaching and learning methods

Blackboard + pen + data show

[1] Course structure

The week	hours	Required learning outcomes	Required learning outcomes	Teaching method	Evaluation method
the first	2	Linear space	Subset of a linear space	theory	Daily questions with assignments
the second	2	Linear space	Subspaces and convex sets	theory	Daily questions with assignments
the third	2	Linear space	Direct sums , projection and some inequalities important	theory	Daily questions with assignments
the fourth	2	Normed linear space	Quotient norm and quotient maps	theory	Daily questions with assignments
Fifth	2	Normed linear space	Completeness of normed linear space	theory	Daily questions with assignments
Sixth	2	Normed linear space	Series in normed linear space	theory	Daily questions with assignments
Seventh	2	Normed linear space	Bounded subset of normed linear space	theory	Daily questions with assignments
Eighth	2	Normed linear space	Totally bounded subset of normed linear space	theory	Daily questions with assignments
Ninth	2	Normed linear space	Finite dimensional normed linear space	theory	Daily questions with assignments
The tenth	2	Hilbert space	Completeness an inner product space	theory	Daily questions with assignments
eleventh	2	Hilbert space	Orthogonality in Hilbert space	theory	Daily questions with assignments
twelveth	2	Hilbert space	Best approximation in Hilbert space	theory	Daily questions with assignments
Thirteenth	2	Bounded linear operators an functionals	Definitions of bounded linear operators and functionals with some examples and theorems	theory	Daily questions with assignments
fourteenth	2	Bounded linear operators an functionals	Dual space in Hilbert space	theory	Daily questions with assignments
Fifteenth	2	The exam is before the end-of-course exam	The exam is before the end-of-course exam	theory	Various questions

Graduation research projects	**Social services (including, for example, guest lectures, vocational training, and field studies(**

12. Infrastructure	
Required readings ***Course books*** ***Other***	**-Introduction to functional analysis and its applications** **-Introductory of functional analysis with applications** **-Topics in functional analysis** **Functional Analysis Problems with Solutions** **-Papers of functional analysis with applications**
Reference	**Functional Analysis Notes**

Admissions	
1. Approval of admission conditions for students in accordance with the regulations of the Ministry of Higher Education and Scientific Research (admission to graduate studies is by university order from the university presidency) **2. To pass the department's personal examination.** **3. Bachelor's average to obtain a master's degree, and bachelor's and master's averages to obtain a doctoral degree.** **4. The department's capacity includes postgraduate students in general, private, and privileges channels**	**Prerequisites**
4	**The smallest number of graduate students**
5 - 15	**The largest number of graduate students**