ATTACHMENT 2 (e)

Course Specifications

Kingdom of Saudi Arabia

The National Commission for Academic Accreditation & Assessment

Course Specifications
(CS)
Course Specifications

Institution/ **University of Dammam** Date: **2/3/2014**

College/Department /**Faculty of science –Department of Physics**

A. Course Identification and General Information

1.Course title and code: **Computational Physics PHYS 406**
2. Credit hours: **2 Cr.Hr**
3. Program(s) in which the course is offered. (If general elective available in many programs indicate this rather than list programs) **Bachelor of Physics from Physics department/ College of Science**
4. Name of faculty member responsible for the course **A specific team from the Physics Department**

5. Level/year at which this course is offered
Level 8/Year 4

6. Pre-requisites for this course (if any)
MATH 180 & PHYS 210

7. Co-requisites for this course (if any)
Scientific English

8. Location if not on main campus
Location is on the main campus/ Faculty of Sciences

9. Mode of Instruction (mark all that apply)

a. traditional classroom	yes	What percentage?
10% b. blended (traditional and online)	yes	What percentage?
70% c. e-learning	No	What percentage?
0% d. correspondence	No	What percentage?
0% f. other	yes	What percentage?
20%		

Comments:
Using The Flip Lectures So that The Lecture Notes were Posted Before Lecture In The Black Board to inhance the student Based Lectures and Cooperative and interactive learning.

B Objectives

1. What is the main purpose for this course?

1. **Students work toward mastering computational skills, needed to work in classical and quantum physics using the computer.**
2. **Students will understand the basic concepts and analyze the physical problems into the essential parameters and correlate between them.**
3. **Understanding Numerical methods and their influence in complicated problem solving.**
4. **Solving Most of Physical problems by writing computer programs using Numerical methods.**
5. **To know many of The Matlap package functions, which can help him in performing simulation.**
6. **To develop the student's awareness to evaluate some measurable physical parameters via simulation.**

2. Briefly describe any plans for developing and improving the course that are being implemented. (e.g. increased use of IT or web based reference material, changes in

content as a result of new research in the field)

1. **The course material is written as a Power Point text that could be accessed by the students enrolled in the course. The text is provided with huge number of detailed windows images corresponds to the text, for helping the student to self-learning.**
2. **Lectures were provided in Computer Lap which is the first time for this course to be taught and the student apply at computers immediately.**
3. **Electronic materials and computer based programs are suitable and utilized to support the lecture course material via real time viewing (what you hear is what you see).**
4. **Simplifying the analysis of some physics experiments and phenomena, to be easy for simulation with computer software.**
5. **Lecture notes were posted for the student via blackboard before lectures time so as to achieve the benefits of inverted lectures.**

C. Course Description (Note: General description in the form used in Bulletin or

handbook) Course Description:

1. Topics to be Covered

List of Topics	**No. of Weeks**	**Contact hours**
Introduction: Including Small Program+ Addition Of Two Velocities And Finding The Mean Velocity	**1**	**2**
Computer algorithms and languages, Applications: Selection Statements-Using If Statement-Case Statement	**1**	**2**
Computer algorithms and languages, Applications: Converting Temperature From Celsius Into Kelvin+ Using For Loop - Converting Temperature From Celsius Into Kelvin In Step Of One And Then In Step Of Five	**1**	**2**
Water Flow From Pocket Example	**1**	**2**
Solution of Algebraic Equation-Zero Finding Methods Shooting Methods: Midpoint (Bisection Method)	**1**	**2**
Solution of Algebraic Equation -Zero Finding Methods Shooting Methods: Newton Raphson Method	**1**	**2**

Interpolation and Numerical Differentiation-Newton's Forward(backward) Difference Formula	**1**	**2**
Numerical Integration -Simpson's Rule	**1**	**2**
Numerical Integration -Trapezoidal Rule	**1**	**2**
Ordinary Differential Equations – Eulers Method	**1**	**2**
Introduction To Matlap - matrix laboratory	**1**	**2**
Design of Simulation Programs	**2**	**4**

2. Course components (total contact hours and credits per semester):

	Lecture	Tutorial	Laboratory or Studio	Practical	Other:	Total
Contact Hours	**26**	**N/A**	**Lectures are provided in Computer LAB**	**N/A**	**6 Hours Free Lab+13 Hrs Office Hr**	**45**
Credit	**2**					

3. Additional private study/learning hours expected for students per week**.**	**12**	

4. Course Learning Outcomes in NQF Domains of Learning and Alignment with Assessment Methods and

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On the table below are the five NQF Learning Domains, numbered in the left column.

First, insert the suitable and measurable course learning outcomes required in the appropriate learning domains (see suggestions below the table). **Second**, insert

supporting teaching strategies that fit and align with the assessment methods and intended learning outcomes. **Third**, insert appropriate assessment methods that accurately measure and evaluate the learning outcome. Each course learning outcomes, assessment method, and teaching strategy ought to reasonably fit and flow together as an integrated learning and teaching process. (Courses are not required to include learning outcomes from each domain.)

Code #	NQF Learning Domains And Course Learning Outcomes	Course Teaching Strategies	Course Assessment Methods
1.0	**Knowledge**		
1.1	**Knowing capabilities and features of Computer Language c++ package**	**Homework assignments and solving physics problems with the relevant tools from C++.**	• **In class a large number of multiple choice questions and short MCQs quizzes.** • **Major and final examinations.** • **Evaluation of the written reports.**
1.2	**Recognizing the main Constituents of the main window of C++ package**	**Discussions of homework written reports about analyzing some physical experiments and phenomena.**	
1.3	**Knowing processing Numerical and symbolic calculations.**	**Dividing into groups homework is provided with written reports about Numerical different methods**	
1.4	**Recall the correct names and functions of Matlp package which facilitate the physical problems processing.**	**In-class lecturing where the previous knowledge is linked with other physics**	

		courses as well as defining the physical concepts of the experiments and some physics phenomena.	
2.0	**Cognitive Skills**		
2.1	**Analyzing real experimental data of previous studied experiments in labs .**	**Discussions in the class during lectures .**	• **In class multiple choice questions and short MCQs quizzes.** • **Major and final examinations.** • **Checking and monitoring the solution of problems.** • **Checking the homework reports about analyzing experiments and physics phenomena.** • **Monitoring student during using computer and key board.**
2.2	**Identify the essential parameters of the physics problem (either measurable or not).**	**Homework assignments as well as experiments and phenomena analysis.**	
2.3	**Summarize and describe the algorithm used for simulation, and knowing that, there are different algorithms for the same physical entity leading to the same final result.**	**Problem solving in the class with the C++ and MATLAP package.**	
2.4	**Investigate and formulate data with C++ and MATLAP**	**The studies related to the course topics.**	

2.5	**Writing by keyboard in a right and fast rhythm.**	**Teaching in Computer Lap.**	
2.6	**Analyzing some physical experiments and**	**On group homework.**	
	phenomena and preparing, then for simulation.		
3.0	**Interpersonal Skills & Responsibility**		
3.1	**Work independently and as a part of team.**	• **Conducting group problems and writing group reports.** • **Solving problems in groups during class.**	• **Writing single reports.** • **Assessment of the solution of problems.** • **Grading homework assignments.** • **Grading discussions in the class.**
3.2	**Manage resources, time and other members of the group.**	• **Checking the ability of formulating questions in different forms about the course topics.** • **Checking the smart thinking in analyzing physics experiments and physical phenomena.**	
4.0	**Communication, Information Technology, Numerical**		
4.1	**Performing processing the experimental data with computer and Communicate and discus the results of the work to others via E-mails.**	**Incorporating the computer as well as the computational tools in the course requirements.**	**Evaluate written summary reports and data manipulation.**
4.2	**Applying the computational and tools by Solving problems and writing reports.**	**Writing reports about analyzing problems.**	

4.3	**Employ deep thinking for solving problems.**	**Using internet for searching and communication.**	
5.0	**Psychomotor**		
5.1	**Writing by keyboard**	**Training**	**Monitoring during operation**
5.2			

5. Map course LOs with the program LOs. (Place course LO #s in the left column and program LO #s across the top.)

Course LOs #	**Program Learning Outcomes (Use Program LO Code #s provided in the Program Specifications)**																	
	1.1	**1.2**	**1.3**	**1.4**	**2.1**	**2.2**	**2.3**	**2.4**	**2.5**	**2.6**	**3.1**	**3.2**	**4.1**	**4.2**	**4.3**	**5.1**	**5.2**	
1																		
2																		
3																		
4																		
5																		

6. Schedule of Assessment Tasks for Students During the Semester

	Assessment task (e.g. essay, test, group project, examination, speech, oral presentation, etc.)	Week Due	Proportion of Total Assessment
1	**Major examination I**	**6**	**15 %**
2	**Major examination II**	**14**	**15 %**
3	**Class activates (class quizzes, homework, problem analysis discussion and written summary reports).**	**Among Semester**	**20 %**
4	**Final exam**	**16**	**50 %**
5			
6			
7			
8	**Total**		**100%**

D. Student Academic Counseling and Support

1. Arrangements for availability of faculty and teaching staff for individual

student consultations and academic advice. (include amount of time teaching staff are expected to be available each week)

- **Office hours 4 hr/ week.**
- **Help through office phone, cell phone and internet (open time)**

E Learning Resources

1. List Required Textbooks • **Computational Physics. M. Thijssen; Cambridge Univ.** • **Computational Physics: N. J. Giordand, H. Nakanishi; Prentice Hall**
2. List Essential References Materials (Journals, Reports, etc.) **• Ivan T Dimov, Monte Carlo Methods for Applied Scientists, World Scientific, (2008)** **• Stephen Lynch, Dynamical Systems with Applications using Mathematica, Birkhauser Boston, (2007).** **• K.D. M¨oller, Optics - Learning by Computing, with Examples Using Mathcad, Matlab, Mathematica, and Maple - 2nd Edition , Springer (2007)** **• Ferdinand E Cap , Mathematical Methods in Physics and Engineering with Mathematica, CHAPMAN & HALL/CRC (2003).** **• M L Abell James P Braselton, Mathematica by Example, 3rd, Academic Press, (2004)** **• Martha L. Abell, and James P. Braselton, Differential equations with Mathematica, Academic Press, (1993)**
3. List Recommended Textbooks and Reference Material (Journals, Reports, etc) **• N.J. Giordand, H. Nakanishi, Computational Physics, Prentice Hall (2005).** **• J. M. Thijssen, Computational Physics, Cambridge University press (1999)** **• Bruce E. Shapiro, Introduction to Mathematical Modelling in Mathematica, A Course for Health Professionals, (1998).** **• V.D. Irtegov, T.N. Titorenko, Using the system "Mathematica" in problems of mechanics, Mathematics and Computers in Simulation 57 (2001) 227–237**
4. List Electronic Materials, Web Sites, Facebook, Twitter, etc. **Web Sites: Science direct; Google.com; Google+; Black Board ; Youtube**
5. Other learning material such as computer-based programs/CD, professional standards or regulations and software. **Multi media associated with the text books and the relevant websites. C++ software.**

F. Facilities Required

Indicate requirements for the course including size of classrooms and laboratories (i.e. number of seats in classrooms and laboratories, extent of computer access etc.)

1. Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)

- **Lecture room with an enough number of seats.**
- **Lecture room must be furnished with data-show and internet facility.**
- **Auditorium of a capacity of not less than 100 seats for large lecture format classes.**

1. Computing resources (AV, data show, Smart Board, software, etc.)

- **Computer room containing an enough number of systems or using personal computers for the students in home.**

2. Other resources (specify, e.g. if specific laboratory equipment is required, list requirements or attach list)

- **Availability desktop computer for each student in computer lab furnished by C++, Microsoft Office 2007 and Mathematica package Version 6 at least.**
- **Safety facilities.**

G Course Evaluation and Improvement Processes

1 Strategies for Obtaining Student Feedback on Effectiveness of Teaching • **Course evaluation by student.** • **Meeting with students** • **e-suggestions** • **Open door policy**
2 Other Strategies for Evaluation of Teaching by the Instructor or by the Department • **Peer consultation on teaching.** • **Departmental council discussions.** • **Discussions within the group of faculty teaching the course.**
3 Processes for Improvement of Teaching • **Conducting workshops given by experts on teaching and learning methodologies. Searching on the modern methods manipulating similar courses in other universities all over the world.**
4. Processes for Verifying Standards of Student Achievement (e.g. check marking by an independent member teaching staff of a sample of student work, periodic exchange and remarking of tests or a sample of assignments with staff at another institution) • **Providing samples of all kinds of assessment in the departmental course portfolio of each course.** • **Assigning group of Other Dept. staff members teaching the relavent course to grade same questions for various students.**

5 .Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement.

- **the course material and learning outcomes are periodically reviewed and the changes to be taken are approved in the departmental .**
- **The head of department and faculty take the responsibility of implementing the proposed changes.**
- **Collecting all reports and evaluations at the end of the year for a reviewing purpose.**
- **Conducting a workshop to presents finding of reports and evaluation to share knowledge.**