COURSE SPECIFICATIONS
(CS)

Thermodynamics Laboratory

PHYS 391

June 2018

Course Specifications

Institution: King Saud University	Date: 2018
College/Department: College of Science, Physics &Astronomy Department	

A. Course Identification and General Information

1. Course title and code: Thermodynamics Laboratory (PHYS 391)
2. Credit hours: 2(0+0+4)
3. Program(s) in which the course is offered. (If general elective available in many programs indicate this rather than list programs) Physics and other science and engineering programs
4. Name of faculty member responsible for the course Dr.
5. Level/year at which this course is offered: 6th level
6. Pre-requisites for this course (if any): Thermodynamics (PHYS 241)
7. Co-requisites for this course (if any):
8. Location if not on main campus 1. Main campus in Diriyah , College of Science, Department of Physics & Astronomy

9. Mode of Instruction (mark all that apply)

a. traditional classroom		What percentage?	
b. blended (traditional and online)	√	What percentage?	20%
c. e-learning		What percentage?	
d. correspondence		What percentage?	
f. Lab	√	What percentage?	80%

Comments:

B Objectives

1. What is the main purpose for this course?

a) The student should be able to acquire a good background about heat and temperature and their basic laws
b) The student should have experience on the concept of heat transfer between different bodies
c) The student should have enough experience on the laws of thermodynamics and their applications.

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)

- Assigning extra hours for discussing and demonstrating some interesting applications on the laws of thermodynamics.
- The course material is discussed during tutorials
- Using the internet resources to access particular advanced topics related to the course topics
- Upgrading the experiments and developing the measurement procedures and data analysis

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

Course Description:
Specific Heat – longitudinal expansion – Joule's Law (The mechanical equivalent of heat) – Boyle's Law - Newton's law of cooling – Viscosity - Heat Engine - Carnot Engine - Heat Transfer- Determination of density and expansion of fluids.

1. Topics to be Covered

List of Topics **Experiments will be performed by the students:**	No. of Weeks	Contact hours
Specific heat	1	4
longitudinal expansion	1	4
Joule's Law	1	4
Boyle's Law	1	4
Newton's law of cooling	1	4
Viscosity	1	4
Heat Transfer	1	4
Heat Engine	1	4
Carnot Engine	1	4
Determination of density and expansion of fluids.	1	4

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

	Lecture	Tutorial	Laboratory or Studio	Practical	Other:	Total
Contact Hours			40			40
Credit			20			20

3. Additional private study/learning hours expected for students per week. 2 hours

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

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**		
	- The student should recognize the difference between Specific Heat, Heat Transfer and their basic laws - To recognize knowledge about some phenomena associated with temperature variations - Recognizing Some applications of thermodynamics laws (i.e. Heat Engine - Carnot Engine)	- Lecturers and debates - Homework assignments - Lab demonstrations - small group work	- Exams -peer evaluations - analytical reports -long and short essays - group reports
2.0	**Cognitive Skills**		
	- To explain the daily life applications of the studied topics. - To explain the most famous and useful instruments build on the studied topics. - To recognize how technology is built from simple to advanced present states - To summarize some interesting experiments and applications in the field of the studied course.	- whole group and small group discussions - Case studies - individual presentation - brainstorming	-portfolios -discussion forums -interviews -debates
3.0	**Interpersonal Skills & Responsibility**		
	- writing reports	-Guest speakers	-Individual and group

	- To modify the English language - To demonstrate solving problems - To illustrate Searching on the internet - choosing the material of the course	- whole group and small group discussions - research activities -projects	presentations -speeches - posters - case studies
4.0	**Communication, Information Technology, Numerical**		
	- To illustrate how to Communicate with others: the lecturer – students in the class - To interpret Information Technology through the Internet and to assess the computer skills - To evaluate the Numerical skills through: solving problems- computation – data analysis – feeling physical reality of results.	- memorization - projects - whole group and small group discussions - brainstorming	- log books - analytical reports - graphic organizers - graphs and tables - group presentations
5.0	**Psychomotor**		
	Not applicable	Not applicable	Not applicable

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	Attendance and proceeding experiments		20%
2	Analyzing the data and writing it in the notebook		20%
3	Final theoretical exam		20%
4	Final Practical exam		40%

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)

- 2 hours weekly

E Learning Resources

1. List Required Textbooks

1- Physics for Scientists and Engineers 9th Edition, R. Serway and J. Jewett, Cengage learning-USA, (2016). 2- Heat and Thermodynamics (8th edition), W. Zemansky, Mc Graw Hill India; 8 edition (2011) 3- special notebooks for thermodynamics experiments.
2. List Essential References Materials (Journals, Reports, etc.) 1- Physics for Scientists and Engineers 9th Edition, R. Serway and J. Jewett, Cengage learning-USA, (2016). 2- Heat and Thermodynamics (8th edition), W. Zemansky, Mc Graw Hill India; 8 edition (2011) 3- special notebooks for thermodynamics experiments.
3. List Recommended Textbooks and Reference Material (Journals, Reports, etc) 1- Physics for Scientists and Engineers 9th Edition, R. Serway and J. Jewett, Cengage learning-USA, (2016). 2- Heat and Thermodynamics (8th edition), W. Zemansky, Mc Graw Hill India; 8 edition (2011) * There are Several books available at the Central Library of King Saud University * Give references as needed and research topics requested from the student.
4. List Electronic Materials, Web Sites, Facebook, Twitter, etc. Websites on the internet that are relevant to thermodynamics experiments.
5. Other learning material such as computer-based programs/CD, professional standards or regulations and software. Multimedia relevant to thermodynamics experiments

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.) • Laboratory room capacity of 25 students
2. Computing resources (AV, data show, Smart Board, software, etc.) • Computer room containing at least 15 systems
3. Other resources (specify, e.g. if specific laboratory equipment is required, list requirements or attach list) • Availability of demonstrative materials relevant to the course material • Safety facilities

G Course Evaluation and Improvement Processes

1 Strategies for Obtaining Student Feedback on Effectiveness of Teaching • Course evaluation by student • Students- faculty meetings
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 the teaching and learning Methodologies.

• Periodical departmental revisions of its methods of teaching. • Monitoring of teaching activates by senior faculty members.
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 assessments in the departmental course portfolio of each course • Assigning group of faculty members teaching the same course to grade the 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 and higher councils. • The head of department and faculty take the responsibility of implementing the proposed changes in the course materials.

Name of Instructor: _____

Signature: _____ Date Report Completed: _____

Program Coordinator: _____

Signature: _____ Date Received: _____