

<p>Kingdom of Saudi Arabia Ministry of Higher Education <b>Qassim University</b> College of Engineering</p>		<p>المملكة العربية السعودية وزارة التعليم العالي جامعة القصيم كلية الهندسة</p>
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## *Polymer Processing*

**College: Engineering**

**Department: Mechanical**

**First: Course Definition**

**1- Course Code: ME 634**

**2- Units: 3 credit hrs**

**3 – Semester :**

**4 -Prerequisite : Manufacturing Processes1 – Material Science**

**5- Co-requisite:**

**6- Location (if not on main Campus):**

**Second: Course Objectives**

The Course makes students able:

- 1- To be familiar with general properties, thermal behavior of polymers, and ultimate properties of polymers.
- 2-To be familiar with the terminology related to thermoplastic, thermosetting and elastomeric polymers.
- 3-To explain the difference between the amorphous and crystalline states of polymers.
- 4-To analyze the mechanical properties and the deformation mechanisms of polymers.
- 5-To be familiar with the transport phenomena in polymer processing.
- 6- To apply the Finite Difference Method, Boundary Element methods and Radial function method in polymers.

**Third: Course Specifications**

<b>1- Topics to be covered</b>		
Subject	No of Weeks	Units
Introduction to Polymer Material Science	1	3
Dimensional analysis and scaling	2	6
Transport phenomena in polymer processing	2	6
Analysis based on analytical solutions	2	6
introduction to numerical analysis	2	6

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Finite Difference Method	2	6
Boundary Element methods	2	6
Radial function method	2	6

## 2- Course components (Total hrs in the Semester)

Lecture	Exercise	Other
45	--	

## 3- Intended Learning Outcomes of the Course (ILO's)

### a. Knowledge

#### i) Description of the knowledge to be acquired:

- Principles of polymers.
- An industrial context and in appropriate vocabulary, technical issues related to current practice in injection molding of engineering components .
- The dimensional analysis and scaling.
- The difference between thermoplastic, thermosetting and elastomeric polymers

#### ii) Teaching strategies to be used to develop that knowledge

- Lectures
- Assignments, at home
- Discussions in the Class
- Case study Report (data collection, internet search, and reporting)

#### iii) Methods of assessment of knowledge acquired

- **Quizzes:** to assess understanding of the course knowledge.
- **Assignment reports:** to assess ability to answer some comprehensive questions.
- **Midterm Exams:** to assess understanding of the course knowledge.
- **Final Exam:** to assess understanding of the course knowledge.

### b- Cognitive (Intellectual) Skills

#### i) Cognitive skills to be developed

- The ability to analyze, and determine the solutions of the problems based on analytical solutions.
- The ability to apply the numerical methods in solving the solutions related to polymers.
- The ability to use the Finite Difference Method and Boundary Element methods

#### ii) Teaching strategies to be used to develop these cognitive skills

- Lectures
- Assignments, at home

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- Discussions in the Class
  - Case study Report (data collection, Internet search, and reporting)
- iii) Methods of assessment of students cognitive skills**

- **Quizzes:** to assess the ability to solve quickly some problems.
- **Assignment reports:** to assess the ability to solve and analyze some comprehensive problems.
- **Midterm Exams:** to assess the ability to discuss, analyze, and solve the associated problems.
- **Final Exam:** to assess the intellectual skills such as analytical skills and ability to solve machine problems.

**c. Interpersonal Skills and Responsibility**

- i) Description of the interpersonal skills and capacity to carry responsibility to be developed**
- Team work
  - Ideas development and sharing with others

- ii) Teaching strategies to be used to develop these skills**
- Assignments, at home
  - Discussions in the Class
  - Case study Report (data collection, Internet search, and reporting)
- iii) Methods of assessment of students interpersonal skills and capacity to carry responsibility**
- **Unified reports and Seminars:** to assess the integration done by the student in a unified report and presentations.
  - **Oral Group Exams:** to assess interactive and communication abilities.

**d. Communication, Information Technology and Numerical Skills**

- i) Description of the skills to be developed in this domain**
- Use of the internet search
  - Technical report writing

- ii) Teaching strategies to be used to develop these skills**
- Assignments, at home
  - Assignment Reports (data collection, Internet search, and reporting)
- iii) Methods of assessment of students numerical and communication skills**

- **Assignment Reports:** to assess technical report writing abilities.

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- **Discussion Groups:** to assess interactive and communication abilities.

**e. Psychomotor (if applicable) & Other Non-cognitive Skills**  
i) *Description of the psychomotor or other skills to be developed and the level of performance required*  
**Not applicable**  
ii) *Teaching strategies to be used to develop these skills-*

**iii) Methods of assessment of student's psychomotor skills**

<b>4- Student Assessment Schedule</b>			
<i>Serial</i>	<i>Assessment tool (test, group project, examination etc.)</i>	<i>Week due</i>	<i>Weight</i>
1	Quiz 1	Week 2	2%
2	Assignment 1	Week 4	2%
3	Quiz 2	Week 4	2%
4	Quiz 3	Week 5	2%
5	Mid Term Exam1	Week 6	15%
6	Quiz 4	Week 8	2%
7	Quiz 5	Week 9	2%
8	Mid Term Exam2	Week 12	15%
9	Assignment 2	Week 13	2%
10	Continuous class evaluation	1st -15th	2%
11	Group reports and seminars	Week 13	2%
12	Attendance	1st -15th	2%
13	Final Exam	Week 16	50%

**5- Student Support**  
6 Office hours per week are offered by the instructor to aid the students and support them.

**6- Learning Resources) Essential Books (References)**  
(1) Purushottam D. Gujrati et al, *Modelling and Simulation in Polymers*, Wiley, 2010.  
(2) R. J. Roe, *Computer Simulation of Polymers*, Prentice Hall Edition, 2007.

**ii) Course Notes**

**iii) Recommended Books**

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## 7- Course Evaluation and Improvement Processes

### 1 Strategies for Obtaining Student Feedback on Effectiveness of Teaching

- Questionnaire,
- Observing the students opinions recorded in the college student site
- Appeal box
- Carrying out extensive questioners by a sample of the distinguished students just after the graduation from the college.

### 2 Other Strategies for Evaluation of Teaching by the Instructor or by the Department

- Periodical review of the teaching methods by both the department council and the education affairs vice dean.-
- Questionnaire,
- Observing the students opinions recorded in the college student site
- Appeal box

### 3 Processes for Improvement of Teaching

- Evaluation of the course outlines by external staff member from outside the university
- Periodical contact with the different engineering authorities and industries for evaluating and getting their feedback and suggestions concerning the course outlines.

### 4. Processes for Verifying Standards of Student Achievement

It is planned to:

- Check marking of a sample of student work by an independent faculty member.
- Exchange periodically, and remark a sample of assignments with a faculty member in King Saud University (KSU).

### 5. The planning arrangements for periodically reviewing course effectiveness and planning for improvement.

- Assessment and evaluation of the level of achieving the course outcomes through a continuous improvement process (part of a quality assurance system established by the university),
- Consequently, actions are to be taken to improve the course delivery when necessary.
- Review of the course objectives, outcomes and curriculum each 2 years.