جامعة : المنصورة

كليـة : العلـــــوم

قســم : الرياضيات

١- بيانات المقرر		
كود المادة : Math 425	اسم المقرر : Hydrodynamic	المستوى: الرابع
التخصص : رياضيات	عدد الوحدات الدراسية: ٣ ساعة معتمدة نظرى ٢: تمارين: ٢ عملى: ٠	

٢- هدف المقرر :	**For students undertaking this course, the aims are to:** - Study the dynamics of fluids is a central theme of modern applied mathematics. It is used to model a vast range of physical phenomena and plays a vital role in science and engineering. - Provide an appreciation of the complexities and beauty of fluid motion. This will be brought out in lectures, computer demonstrations and visualizations,web pages.
٣- المستهدف من تدريس المقرر	
أ- المعلومات و المفاهيم :	**a-Knowledge and Understanding :** **On completing this course, students will be able to:** a1 - Design activities that relate theory to practice and combine analytical skills and creativity in the solution of real engineering problems. a2 - Use concepts and mathematical techniques learned from this course for analysis of other partial differential equations arising for example in plasma physics or nonlinear optics. a3 - Understand the underlying mathematics of the physical processes in a number of different fluid flows. a4- Understand the principal concepts about the fluid density, pressure, velocity, temperature, viscosity.
ب- المهارات الذهنية:	**b- Intellectual Skills:** **On completing this course, students will be able to:** b1- Model real world problems to mathematical language. b2- Use computer simulation to solve some problems. b3- Come up with qualitative and quantitative solutions for particular fluid dynamics problems ranging from simple laminar flows to fully developed turbulence.

c-Professional and Practical Skills: **On completing this course, students will be able to:** c1 - Understand how to apply the material of this course to the motion of solid bodies in viscous fluids. c2 - Use PDEs techniques to solve some problems. c3 - Use numerical analysis to solve PDEs.	**ج- المهارات المهنية الخاصة بالمقرر :**
d-General and Transferable Skills: **On completing this course, students will be able to:** d1- Solve problems. d2- Work in a team. d3- Use Internet and Library.	**د- المهارات العامة :**
• Principal Concepts. • Euler's Equation of motion and continuity equation. • Hydrostatics. • Some general Theorems, Bernouli's equation. • Analysis of fluid motion. • Potential flow. • The motion in two dimensions. • Introduction to viscous fluid. • The stresses in viscous fluid. • Navier- Stokes equation of motion of viscous fluid. • Applications.	**٤- محتوى المقرر :**
1- Three Hours Lectures per week. 2- One Hour Tutorial per week.	**٥- أســـاليـــب التعليـــم و التعلـم:**
The same as normal students, only skeletal disabilities are allowed in the Faculty of Science.	**٦- أساليب التعليم و التعلم للطـــلاب ذوى القـــدرات المحـــدودة :**
٧- تقويـــــم الطـــلاب :	
1- Oral Exam. to assess a1-a4,b1-b3,d1-d3 2- Final Exam to assess a1-a4,b1-b3,c1-c3 3- Mid-Term Exam to assess a1-a3,b1,b3,c1,c2	**أ- الأساليب المستخدمة**
1- Oral Exam week 16 2- Final Exam week 16	**ب- التوقيت**

3- Mid-Term Exam week 7	
- Mid-Term Examination 10 - Final-Term Examination 80 - Oral Examination 10 - Practical Examination 0 Total 100%	**ج- توزيع الدرجات**
٨- قائمة الكتب الدراسية و المراجع :	
Lecture Notes.	**أ- المذكرات**
Introduction to fluid dynamics, by Batchelor.	**ب- الكتب ملزمة**
D.J. Acheson, Elementary Fluid Dynamics, OUP. (The main text. Excellent and affordable). L.D. Landau and E.M. Livshitz, Fluid Dynamics, OUP. (A classic). D.J. Tritton, Physical Fluid Dynamics (Second Edition), Oxford Science Publs. (The emphasis is on the physical phenomena and less on the mathematics).	**ج- كتب مقترحة**
http://www.aoe.vt.edu/~devenpor/aoe5104/	**د- دوريـــات علميـــةأو نشرات**

(أ) مصفوفة المعارف والمهارات المستهدفة من المقرر الدراسى

المحتويات للمقرر	اسبوع الدراسة	المعارف الرئيسية	مهارات ذهنية	مهارات مهنية	مهارات عامة
Principal Concepts.	1	a4	b1	c1	d3
Euler's Equation of motion and continuity equation.	2-3	a2	b3		d1
Hydrostatics.	4	a1		c1	d1,d3
Some general Theorems, Bernouli's equation.	5-6	a3	b1	c2	d1
Analysis of fluid motion.	7	a4	b3		d3
Potential flow.	8	a2,a3	b1	c2	
The motion in two dimensions.	9-10	a1		c1	d1
Introduction to viscous fluid.	11	a3		c2	d3
The stresses in viscous fluid.	12	a3			d3

Navier- Stokes equation of motion of viscous fluid.	13	a1			d3
Applications.	14	a2,a3	b1,b2,b3	c1, c3	d1,d3

أستاذ المادة : د. مبارك نجيب

رئيس مجلس القسم العلمي :ا.د. مجدى الياس فارس