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NEW COURSE PROPOSAL

GUIDANCE NOTES are available on-line [by highlighting the relevant Question number] at:
http://www.abdn.ac.uk/staffnet/teaching/senas-1034.php

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Course - New ▼

1. Course Title Computational Fluid Dynamics

2. Course Co-ordinator(s) [See Guidance Note] Dr Jeff Gomes

3. College: COPS ▼

4. Parent School (one only): School of Engineering ▼

5. Sponsoring Schools: School of Engineering ▼

Add new Sponsoring School

6. Post Graduate or Undergraduate: Required Undergraduate ▼

7. The Course is to be offered as part of...[See Guidance Note]

Sustained Study Programme ○ 6th Century Course ○ N/A ◉

8a. If the course will replace an existing course, see the Guidance Note and insert the code(s) of those to be replaced; otherwise leave blank:

8b. Is the existing course code to be withdrawn - Required Yes ○

No ◉

9. UoA level at which the course will be offered Select all that apply? [See Guidance Note]

☐ 0 ☐ 1 ☐ 2 ☐ 3 ☑ 4

10. Academic Year in which the course will commence (e.g. 2010-2011) [See Guidance Note]: Required 2015-2016 ▼

11. When will the course be taught? [See Guidance Note]

First Half-session	From Week:	10	To Week:	20
Second Half-session	From Week:		To Week:	
Other (e.g. cross-year): see Guidance Note	From Week:		To Week:	

12. Proposed number of credit points [See Guidance Note]: - Required 15 ▼

13. What is the rationale for introducing the course? [See Guidance Note] - Required

The course has been introduced due to programme changes at Year 5 which are due to curriculum reform at Year 4.

14. Which external reference points did you use in the process of developing this course? [See Guidance Note]

The course is designed to partially meet chemical and mechanical engineering learning outcomes required in accredited Chemical and Mechanical Engineering honours programme.

15. How many students are expected to register for the course and what is the basis for this assumption? [See Guidance Note] - Required

This is a compulsory course for all chemical and mechanical engineering students. The number of students fluctuates wildly depending on the number of direct entry students coming in to level 5.

16. Minimum number of students required for the course to run [See Guidance Note]: Required 10

17. If the number of students to be permitted to register is to be restricted, see the Guidance Note and insert the maximum number and give the reasons in 30; otherwise leave blank:

18. Indicate the mode(s) of delivery of the course [See Guidance Note]:

On Campus ☑ Off Campus ☐ By Distance Learning ☐

19. Indicate the JACS Subject Code(s) for the course, the Discipline(s) [or Institution(s) in the case of off-campus organisations] which will be delivering each, the percentage share of the course, and whether the teaching represents an additional teaching load: [See Guidance Note]

JACS Code(s) - Required	Providing Discipline/Institution(s)	Extra Load? (Y or N)	% Share - Required

H141	Engineering	N	30
F343	Engineering	N	70
		Total:	100

Add new JACS Code

20. Does the School have access to adequate resources to support the teaching and learning (e.g. Teaching Staff, Demonstrators, Bought-In Teaching, Technical (including IT) and Secretarial support, Teaching Accommodation, Library Holdings, Equipment (including IT), Consumables, Computer time, Field Trip Expenditure, Video-conferencing or distance-learning support)? [See Guidance Note] If No, give details in 30: Required

Yes (selected)
No

21. Extracts from the following details will form the Catalogue of Courses entry: [See Guidance Note]

Pre-requisite(s):

- EG3007 (Engineering, Analysis and Methods) and EG3018 (Fluid Mechanics A) OR;
- Registered for PGCert, PgDip or MSc in Process Safety OR;
- Registered for PGCert, PgDip or MSc in Subsea Engineering.

Co-requisite(s):

None

Note(s):

None

Course Aims: **Required**

The course aims to provide understanding of main principles and techniques underpinning computational fluid dynamics (CFD) combining numerical methods with practical experience using appropriate software. The course develops a foundation for understanding, developing and analysing successful simulations of fluid flows applicable to a broad range of applications.

Main Learning Outcomes: **Required**

By the end of the course students should:

A: have knowledge and understanding of:
• Fundamental computational fluid dynamics and applications;
• Finite difference and finite volume discretisation of PDE's and how numerical techniques are applied to flow equations;
• CFD workflow procedures including mesh generation, numerical discretisation schemes and solver methods, assignment of appropriate initial and boundary conditions, pre- and post-processing data.

B: have gained intellectual skills so that they are able to:
• Select appropriate set of numerical methods and discretisation schemes for a particular fluid flow application;
• Recognise terminologies used by CFD practitioners (e.g., mesh grid, boundary conditions, numerical schemes, linear solvers, quality assurance, HPC etc);
• Assess the applicability of a particular model/method and its limitations;

Content: **Required**

The course will provide insight into physical phenomena in environmental and industrial fluid flows via numerical simulations. Whist this motivates the use of computational technologies, even advanced CFD software may lead to incorrect predictions of fluid flow behaviour if used without sufficient understanding of the underlying algorithms and methods. Therefore, this course introduces students to computational methods for solving distinct type of partial differential equations (PDE) that arise in fluid dynamic studies.

This course will involve fundamentals of numerical analysis of PDE, introduction to computational linear algebra, discretisation techniques and numerical schemes to solve time-dependent PDE problems, error control and stability analysis, mesh-generation methods and turbulence models. Hands-on sessions with industry standard software are used to develop CFD skills.

Teaching: **Required**

[e.g. 3 one hour lectures (Tue, Wed, Thur at 11) and 1 one hour tutorial (to be arranged) per week]

Lectures: 1 two-hours + 1 one-hour per week (over 6 weeks);
Practicals: 1 three-hours per week (over 5 weeks);
Tutorials: 1 one-hour per week.

Summative Assessment:

[Indicate below the summative assessment arrangements, e.g. 1st attempt: 1 two hour written examination (60%); continuous assessment (40%). Resit: 1 two hour written examination (100%). If continuous assessment is included please give a breakdown showing format (e.g. essay, lab-work) and/or word length. [See also the Guidance Note]

1st attempt: **Required**

1 two-hour written examination paper (40%) and continuous assessment (60%).

The continuous assessment (CA) will consist of 2 components:
• Problem solving programming exercise (20%);
• Individual reports on assigned Engineering problem involving CFD simulation (40%).

Students are required to pass both the examination and the continuous assessment in order to pass the course. A fail in the exam will not be condoned by a pass in other elements of assessment. In the case of a fail in any element of assessment the overall course grade will be limited to E1.

Resit:

A two-hour resit paper will be provided for candidates who fail the course at the first attempt.

• Candidates who fail the written examination at the first attempt will be required to pass the resit examination;
• Candidates who pass the examination at the first attempt but fail to pass the CA elements will be required to pass the resit of the failed CA component(s);

Formative Assessment: [Indicate below the formative assessment arrangements .] [See also the Guidance Note]

Feedback: **Required**

[Indicate how feedback on formative and summative assessment will be provided to students.]

• Students can receive feedback on their progress with the Course on request at the weekly tutorial/feedback sessions;
• Students are given feedback through formal marking and return of practical reports;
• Students requesting feedback on their exam performance should make an appointment within 2 weeks of the publication of the exam results.

22. Indicate the degree programme(s) with which the course will be associated and whether the course will be compulsory or elective for each programme [See Guidance Note]:

This course is compulsory for all the following programmes:
(a) Degree of Master of Engineering in Chemical Engineering;
(b) Degree of Master of Engineering in Mechanical Engineering;
(c) MSc in Process Safety Engineering.

This course is elective for the following programmes:
(a) Degree of Master of Engineering in Civil Engineering;
(b) Degree of Master of Engineering in Petroleum Engineering;

23. Does this course offer students the opportunity to contribute to its content and structure (e.g. project, dissertation)? [See Guidance Note]. If yes, please give details in 30. Required

Yes ○
No ◉

24. Indicate the total number of hours for the following [See Guidance Note]:

(a) timetabled teaching sessions (e.g. lectures/tutorials/practicals) that each student is expected to attend: 44

(b) time an average student would be expected to devote to private study, including revision: 106

(c) notional student effort required to complete the course [i.e. (a) + (b)]: 150

25a. How does the proposed course address graduate employability? [See Guidance Note] Required

This course will enhance the students' subject-specific and generic skills, and is a programme of study designed to meet the Professional Accrediting Bodies requirements.

25b. Does this course provide opportunities for work-related learning and study overseas (e.g. work placements either as an optional or compulsory component; social responsibility projects and community-based projects; school attachments; Erasmus exchange; and voluntary (unpaid) activities)? [See Guidance Note] If yes, please give details below. Required

Yes ○
No ◉

26. A University of Aberdeen education will enable graduates to become: Academically excellent; Critical thinkers and effective communicators; Open to learning and personal development and Active citizens. In what ways does this course support the development of the University's Graduate attributes? Please indicate below under the following headings: [See Guidance Note] Required - UG Only

Academically Excellent:	*Critical Thinkers And Effective Communicators:*

- In-depth and extensive knowledge, understanding and skills needed for thermal or fluid engineers; - A contextual understanding of past and present knowledge and ideas; - An intellectual curiosity and a willingness to question accepted wisdom and to be open to new ideas.	- A capacity for independent conceptual and creative thinking; - A capacity for problem identification, the collection of evidence, synthesis and dispassionate analysis, developed through CFD practical activities; - A capacity for attentive exchange of views, informed argument and reasoning through group work in Tutorials; - An ability to communicate effectively for different purposes and in different contexts; - An ability to work independently and as part of a team; - A diverse set of generic skills.
Open To Learning And Personal Development:	*Active Citizens:*
- An openness to, and an interest in, life-long learning through directed and self-directed study; - An awareness of personal strengths and weaknesses; - A capacity for self discovery and personal development.	- N/A

27. Will students registering for the course be required to undertake a Protecting Vulnerable Groups Check? [See Guidance Note]: Required

Yes ○
No ◉

28. Are there components of the course, including methods of delivery or assessment, that may be inaccessible to students with disabilities or which they may find it difficult or impossible to complete? If Yes, see Guidance Note and give details in 30: Required

Yes ○
No ◉

29a. Are there any implications for equality and diversity within the course? [See Guidance Note] If Yes, please give details in 30: Required

Yes ○
No ◉

29b. Are there opportunities to promote equality? If Yes please give details in 30 [See Guidance Note]: Required

Yes ○
No ◉

30. Provide below any additional information, including that referred to in 17, 20, 22, 28, and 29 [See Guidance Note]:

Correct information for 9: This course will be offered to * Level 5 *.

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Note that cancelling will exit without saving changes to the form.

31. Are you ready to submit this form?

I am ready to submit ☑
Submit

Submitted? Yes

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