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COURSE STAFF

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Consultation Time: tba

TUTORS        TBA
IMPORTANT NOTICE

This is a web-based Moodle course, so all communication outside of consultation times will be made through Moodle. It is strongly recommended that you check the course details on Moodle daily so as not to miss important announcements concerning lectures, assignments, marks, events and other related matters.
COURSE INFORMATION

Course Size
This course is 6 units of credit (UOC). UOCs indicate the nominal workload for students. The normal workload expectations at UNSW are 25-30 hours per session for each unit of credit; including class contact hours, preparation and time spent on all assessable work. For this course, this means an average total workload of 12 hours per week.

Attendance at Classes
Students are expected to be regular and punctual in attendance at lectures and tutorials during the session. Students who attend less than 80% of their possible classes may not be admitted to the final exam. The following UNSW webpage gives further guidance for attendance at or absence from classes: https://my.unsw.edu.au/

Aims and Learning Outcomes

This course aims to (1) introduce the student to the background knowledge in numerical reservoir simulation which is a widely used tool in petroleum industry and research and (2) guide the student to learn how to solve reservoir engineering problems through the professional use of numerical reservoir simulation.

The learning outcomes are for the student to (1) gain knowledge and skills needed to solve reservoir engineering problems by means of numerical techniques, (2) apply integrated knowledge of math and basic sciences including geosciences to the solution of problems related to fluid flow in porous media and reservoir performance predictions, and (3) understand the function of commercial reservoir simulators for forecasting future oil and gas production from hydrocarbon reservoirs.

Learning and Teaching Strategies

Students are expected to become actively involved in the learning process. In this course we implement new teaching strategies namely: 1) Peer Instruction, 2) Tutorial-Lecture Flipping and 3) Improved Assessment/Feedback.

Peer Instruction

Peer Instruction (PI) is a pedagogical approach where students learn by discussing their ideas, knowledge and experience. In practice, after delivering an important topic/concept, we will give students opportunity to discuss the topic covered. PI provides an opportunity for students to clarify their own understanding in a context that is less confronting than directly answering questions from the instructor. This approach builds the learning community as
students realize they are not alone in misunderstanding or partially comprehending key concepts, as well as providing feedback to the Instructor on the class comprehension.

**Tutorial-Lecture flipping**

Students are challenged to solve a tutorial question before the related topic has been discussed in the lecture. The students will work in groups. First they will discuss the problem statement with their peers and identify the problem. Tutors will get feedback from various groups and guide them if their problem identification is incorrect. Afterwards, they will identify possible solution methods and finally solve the problem. Again, tutors will incrementally guide students through the solution of the problem. The conclusions drawn from the tutorial align with the basic topics for the following lecture. This means that in the lecture, the lecturer can concentrate more on the advanced or more complicated part of the topic under discussion.

**Improved Assessment/Feedback techniques**

In addition to the conventional approaches, we suggest following techniques

1. At the end of every teaching week, students will solve an online quiz which will test their knowledge. These quizzes will not be a part of the final assessment but will provide formative feedback to students and guide instructors in their teaching.

2. Peer feedback following tutorials. This will not be part of the final assessment

3. Online quizzes on Moodle under exam conditions. These quizzes will contribute to the final assessment.

**Projects**

Students will complete a simulation project on: 1) coal seam gas reservoir, 2) condensate gas reservoir or 3) any EOR method. This practice will help develop their content knowledge as well as problem-solving, reasoning, communication, and self-assessment skills.

Students are required to select one of the three project titles listed above. Maximum of 10 students can choose same topic. Summary of the tasks is following:

- conduct a literature review on the production mechanism of the selected topic,
- identify differences in the flow equations for the selected topic and conventional black oil reservoir,
- select a case study which gives simulation field data for the selected topic,
- submit interim report (week-7)
- use the case study data to run simulations using ECLIPSE™
- Analyse the results and submit final report
Report format

Use these notes as a guide to the layout of your reports in text form. In particular, follow these rules –

(a) The format of the title of the file containing your submission should be – “Student number - Name – Subject”. Please use the short form of your name.
(b) The main text should be in Trebuchet 11 point.
(c) The left hand side header should read "PTRL 5004 – Numerical Reservoir Simulation".
(d) The right hand side header should read "Page X"
(e) You should put a line under the header.
(f) The left hand side footer should show the short form of your name
(g) The right hand side footer should show the date (eg "1 October 2014")
(h) You should put a line above the footer.
(i) Headers and footers should be in Trebuchet 11 point.
(j) As a general rule, the contents of reports should be (in this order) –

    Introduction (context and aims)
    Abstract or summary (should include major analysis and findings)
    Assumptions
    Method
    Results & discussion
    Conclusion
    References
    Glossary
    Appendices

(k) The report should have a title page.
(l) Final Report should be no longer than 40 pages. This includes the title page, introduction, summary, assumptions, methods, results & discussion, conclusion, references and glossary section, but does not include the appendices section.
(m) The appendices section should only include tables and figures. It should not include any detailed analysis or results.
ASSESSMENT

The aims of the assessment strategy are to enable the content of the material studied to be examined in a way which educates you as well as allows me to assess your performance. They are also to give opportunities for feedback so that you can improve your performance over the session.

<table>
<thead>
<tr>
<th>Tasks</th>
<th>Week Due</th>
<th>Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quiz – 1</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>Quiz – 2</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td>Project</td>
<td>13</td>
<td>40</td>
</tr>
<tr>
<td>Final exam</td>
<td>UNSW timetable</td>
<td>40</td>
</tr>
</tbody>
</table>
# COURSE SCHEDULE

<table>
<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>29 July</td>
<td>Introduction and overview</td>
</tr>
<tr>
<td>2</td>
<td>5 August</td>
<td>Simulator equations – 1</td>
</tr>
<tr>
<td>3</td>
<td>12 August</td>
<td>Simulator equations – 2</td>
</tr>
<tr>
<td>4</td>
<td>19 August</td>
<td>Numerical Solutions – 1</td>
</tr>
<tr>
<td>5</td>
<td>26 August</td>
<td>Numerical Solutions – 2 / Quiz-1</td>
</tr>
<tr>
<td>6</td>
<td>2 September</td>
<td>Numerical Solutions – 3</td>
</tr>
<tr>
<td>7</td>
<td>9 September</td>
<td>Model &amp; grid selection / Simulator tutorial</td>
</tr>
<tr>
<td>8</td>
<td>16 September</td>
<td>Model &amp; grid selection</td>
</tr>
<tr>
<td>9</td>
<td>23 September</td>
<td>Model initialization</td>
</tr>
<tr>
<td>10</td>
<td>7 October</td>
<td>Treatment of wells</td>
</tr>
<tr>
<td>11</td>
<td>14 October</td>
<td>Pseudo-functions</td>
</tr>
<tr>
<td>12</td>
<td>21 October</td>
<td>Planning a simulation study</td>
</tr>
<tr>
<td>13</td>
<td>28 October</td>
<td>Tutorial/preparation for exam</td>
</tr>
</tbody>
</table>
RESOURCES FOR STUDENTS

Recommended Books:


Discipline-specific WWW Resources:

www.spwla.org     (Society of Petrophysicists & Well Log Analysts)
www.spe.org       (Society of Petroleum Engineers)
www.api.org       (American Petroleum Institute – For Petroleum Standards)

Students seeking resources can also obtain assistance from the UNSW Library. One starting point for assistance is:

info.library.unsw.edu.au/web/services/services.html

ACADEMIC HONESTY AND PLAGIARISM

According to the UNSW website www.lc.unsw.edu.au/plagiarism

Plagiarism is taking the ideas or words of others and passing them off as your own. Plagiarism is a type of intellectual theft.

Plagiarism happens for a number of reasons—one is because some students decide consciously to gain credit for the work of others. However, most incidents of plagiarism are the product not of deliberate cheating, but of underdeveloped academic skills. This course will be an important opportunity for you to develop skills in writing and referencing your sources so that you avoid plagiarism. Look at the website above for help, or see the resources available through The Learning Centre.

A standard UNSW statement on plagiarism is given below.
What is Plagiarism?

Plagiarism is the presentation of the thoughts or work of another as one’s own.* Examples include:

- direct duplication of the thoughts or work of another, including by copying material, ideas or concepts from a book, article, report or other written document (whether published or unpublished), composition, artwork, design, drawing, circuitry, computer program or software, web site, Internet, other electronic resource, or another person’s assignment without appropriate acknowledgement;
- paraphrasing another person’s work with very minor changes keeping the meaning, form and/or progression of ideas of the original;
- piecing together sections of the work of others into a new whole;
- presenting an assessment item as independent work when it has been produced in whole or part in collusion with other people, for example, another student or a tutor; and
- claiming credit for a proportion a work contributed to a group assessment item that is greater than that actually contributed.†

For the purposes of this policy, submitting an assessment item that has already been submitted for academic credit elsewhere may be considered plagiarism.

Knowingly permitting your work to be copied by another student may also be considered to be plagiarism.

Note that an assessment item produced in oral, not written, form, or involving live presentation, may similarly contain plagiarised material.

The inclusion of the thoughts or work of another with attribution appropriate to the academic discipline does not amount to plagiarism.

The Learning Centre website is main repository for resources for staff and students on plagiarism and academic honesty. These resources can be located via:

www.lc.unsw.edu.au/plagiarism

The Learning Centre also provides substantial educational written materials, workshops, and tutorials to aid students, for example, in:

- correct referencing practices;
- paraphrasing, summarising, essay writing, and time management;
- appropriate use of, and attribution for, a range of materials including text, images, formulae and concepts.

Individual assistance is available on request from The Learning Centre.

Students are also reminded that careful time management is an important part of study and one of the identified causes of plagiarism is poor time management. Students should allow
sufficient time for research, drafting, and the proper referencing of sources in preparing all assessment items.

* Based on that proposed to the University of Newcastle by the St James Ethics Centre. Used with kind permission from the University of Newcastle
† Adapted with kind permission from the University of Melbourne.

COURSE EVALUATION AND DEVELOPMENT

The presentation of this course is under continual improvement, so your feedback is highly appreciated. We want your suggestions of what is good and should be retained, and what is not so good and should be improved (with ideas on how to do it). In addition to the standard UNSW Course and Teaching Evaluation and Improvement (CATEI) surveys we will be asking for your feedback in other ways during your studies.

ADMINISTRATIVE MATTERS

Take time to review the documentation on processes and procedures that you will have received at enrolment and from your School. If School documentation is not available, the WebCT Vista site has Administrative Matters documentation for this course.

Expectations of students
UNSW expects regular attendance at lectures and tutorials/laboratory classes/seminars. Although exceptions may be made for special circumstances, we do expect University commitments to take precedence over regular work activities, holidays etc.

UNSW has rules for computer use, for example, for email and online discussion forums. You will have to agree to them when you first access the UNSW network.

We expect everyone – staff and students – to treat each other with respect.

Occupational Health and Safety
Like the wider community, UNSW has strict policies and expectations on Occupational Health and Safety and you should read these. They may be accessed on:

www.riskman.unsw.edu.au/ohs/ohs.shtml

Examination procedures and advice concerning illness or misadventure
If you believe that your performance in one of the assessment components for the course has been significantly affected by illness or other unexpected circumstance, then you should make an application for special consideration as soon as possible after the event by visiting UNSW Student Central.
Applying for special consideration does not mean that you will be granted additional assessment or that you will be awarded an amended result. The latter will be granted at
the discretion of teaching staff and will be considered only in exceptional circumstances. The timing of any additional assessment is entirely at the discretion of teaching staff.

For additional clarification -

1. Students who do not attend a written examination will fail unless they have a valid doctor’s certificate proving that they are ill at the time of the examination.

2. Students who attend a written examination, but who fall ill during the examination will be assessed on the examination paper they submit unless they have a valid doctor’s certificate proving that they are ill at the time of that examination.

3. In the case of illness, the doctor’s certificate must be handed to the Student Centre and copied to the course authority no later than 3 days after the date of the written examination.

4. If a student can prove illness with a doctor’s certificate, in extreme cases only the course authority might give special consideration and arrange another examination before the following UNSW semester. In such cases, the course authority either will arrange another written examination or alternatively will arrange an oral examination attended by 2 or 3 academics. Whether or not the course authority arranges another examination and the form and timing of such an arrangement are entirely at the discretion of the course authority, whose decision is final.

5. The School keeps a register of special consideration applications. The history of a student’s previous applications for special consideration is taken into account when considering each case.

6. If special consideration is granted, the course authority will assess a student based on the final examination and not any previous examination paper that the student might have submitted (see 2 above).

**Equity and diversity**

Those students who have a disability that requires some adjustment in their teaching or learning environment are encouraged to discuss their study needs with the course convener prior to, or at the commencement of, their course, or with the Equity Officer (Disability) in the Equity and Diversity Unit (9385 4734 or www.equity.unsw.edu.au/disabil.html). Issues to be discussed may include access to materials, signers or note-takers, the provision of services and additional exam and assessment arrangements. Early notification is essential to enable any necessary adjustments to be made.