

## 465.420 Geothermal Energy, Fall 2009

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### Instructions on Term Project

#### Purpose

This term project is intended to be enjoyable learning experiences for students. Through the projects, you will become familiar with the technical, economic, political, and environmental issues associated with the topic that you (and other students) are exploring. You are required to demonstrate your competence in fundamental principles of geothermal energy, ability to analyze and synthesize technical problems, and ability to communicate with others effectively.

#### Group and submission

You need to make a group of three and all the assignments should be submitted through eTL unless otherwise instructed.

For the Proposal, you need to fill out the topics submission form which is available in eTL and submit it through e-mail. Only one submission per group is sufficient.

Milestone	Length	Due date	Mark
Proposal	~1 page	25 Sept	10%
Progress Report	~5 pages	30 Oct	20%
Final Report	~20 pages	4 Dec	35%
Presentation	250 minutes (including <u>five minutes of question times</u> )	7 & 9 Dec	35%

[Upload of final report](#)

[14 Dec\\*](#)

[\\* note that late upload of your final report is subject to penalty](#)

#### Assessment

The final end-product of this project is the final reports and you need to give oral presentation during the class at the final week of this course.

This term project will be assessed only on a group basis. It doesn't mean that you have to select best students but it just emphasize the importance of group work. In real-world, group work is far more common and important than individual work. Therefore, if you think your group member is not working hard, you just need to lead them by whatever method you think is suitable.

## Assessment Criteria

Assessment Criteria [is available in a separate sheet](#)~~will be distributed soon~~.

[As usual, one question receives 2 points as participation point and you are encouraged to ask as many questions as possible during other group's presentations.](#)

## Report Writing and Presentation

You may think engineering is all about maths, physics and applying these to industry. This is far from the truth. One big thing which is missing there is 'communication'. You must communicate your idea with various parties, which includes your colleagues, supervisors, clients, government officials, and politicians. Reports and oral presentation are the most common form of communication and you must be good at these if you want to be a successful engineer.

Having said this, your reports and presentation will be assessed based on criteria which will be distributed shortly. One session will be allocated during the course to assist student in writing reports and making oral presentations. However, student should make their own efforts to improve their written and oral communication skills.

Your group has the right to ask for at least one official meeting with the instructor and you are welcome to contact Dr Min to arrange the meeting.

Note that all of you submissions (from proposal to presentation files) concerning this term project will be uploaded in the eTL for other students' references.

## English

All the deliverables including presentation must be in English. However, this is NOT an English course and English will NOT be assessed. Nonetheless, you need to have a good command of English if you want to deliver your work effectively. ~~If necessary, you may have y~~ Your reports [will be checked by someone whose first language is English and returned to you with comments.](#) [Nonetheless, you will have to minimize any linguistic errors in the reports.](#)

## Publication

Compiled term project reports will be published as a conference proceedings, which will be distributed to the students and interested people (total number of copy ~30). This proceedings will be also available in the SNU OpenCourseWare (<http://ocw.snu.ac.kr/>)

### **A list of example topics**

Example topics are listed in the below. However, these are merely examples and you have freedom to choose your own topics. The topics are largely technical but you may also explore the societal aspects depending on your interest.

1. Geothermal Heat Pump
  - Installation of Geothermal Heat Pump in Korea and remaining issues
2. Geomechanics and geothermal energy
  - Drilling & borehole stability for Geothermal Energy development
  - Hydraulic fracturing
3. Enhanced Geothermal Energy
  - Is EGS applicable in Korea?
  - The things we know and we don't know about generating electricity using EGS
4. Case Studies (focus on one site or comparison of a few)
  - The Geysers in California (USA), Soultz site (France), Cooper Basin (Australia), Fenton Hill (USA)
5. Climate change and geothermal energy
  - How geothermal energy can contribute to global efforts in minimizing the climate change
  - Combination of carbon geosequestration and geothermal energy
6. Modeling the geothermal reservoir
  - Numerical simulation of EGS/geothermal reservoir
7. Environmental Impact
  - Environmental Impact of Geothermal Energy
8. Societal and economic aspect of Geothermal Energy
  - Economic Feasibility issues for Geothermal Energy - Is geothermal energy cheap enough? Can that be cheaper in the future?
  - Geothermal Energy - why I never heard of it in Korea? A review on government policy on geothermal energy
  - Criticism on geothermal energy? - Don't fool us anymore. Revisiting the projection (prediction) made in the past

## Final Report Assessment Criteria

Criteria	Excellent (5)	Good (4)	Satisfactory (3)	Unsatisfactory (2)	Poor (1)
Summary (10%)	The summary clearly defines the objectives of the project and methodology used. It includes comprehensive summary of the findings and outcomes.	The summary defines the objectives of the project and methodology used. It includes a summary of the findings and outcomes.	The summary lists the objectives of the project and methodology used. There are minor errors in the summary of the findings and outcomes or they are unclear.	The summary lists some of the objectives of the project and aspects of the methodology used. There are errors in the summary of the findings or they are unclear.	The summary has poorly defined objectives and methodology. There are significant major errors in summary of the findings and outcomes of the project.
Introduction (10%)	Clearly defines the objectives of the project as well as any constraints related to the project. Provide Excellent background information.	Defines the objectives of the project as well as any constraints related to the project. Provide good background information.	Defines the objectives of the project but the constraint (or scope) of the project is unclear. Provide background information.	Objective of the project are not clearly defined. Provided little background information.	Objective of the project are not defined with little background information.
Interpretation/synthesis of information (20%)	Demonstrated a clear appreciation of the problem and the task. Data is properly interpreted and assumptions are made where required and appropriately substantiated.	Demonstrated an adequate appreciation of the problem and the task. Data is adequately interpreted and assumptions are made where required and justified to some extent.	Did not fully appreciate aspects of the problem and the task. There are minor problems with the interpretation of the data and assumptions are not clearly stated or fully justified.	Did not appreciate some aspects of the problem and the task. Some data is misinterpreted and assumptions are not adequately justified or substantiated	Did not appreciate important aspects of the problem and the task. Data is misinterpreted and assumptions are not justified or substantiated.
Methodology/Analysis (30%)	Analyses are undertaken in an accurate, systematic, creative and auditable manner with raw data, assumptions, process and results clearly shown.	Analyses are undertaken systematically. The raw data, assumptions, process and results are shown.	Some inconsistencies are evident in the analyses, raw data or assumptions. The results contain minor errors or are not clearly presented.	Analyses lack rigour and are not based on clearly defined raw data or assumptions. The results contain some errors or are not presented clearly	Analyses appear ad hoc based on confusing raw data or assumptions. The results contain significant errors or are presented in a confusing manner.
Conclusions (10%)	The analysis of the work conducted demonstrates your comprehension and shows insight into the significance of the results. The report concludes with a clear concise summary of the outcomes.	The analysis of the work conducted demonstrates your comprehension and shows some insight into the significance of the results. The report concludes with a summary of the outcomes.	The analysis of the work conducted demonstrates comprehension.	The analysis of the work conducted demonstrates some comprehension.	The analysis of the work conducted demonstrates limited comprehension.
Layout and standard of report (20%) (Please refer to the Appendix I checklist in report writing guide)	Excellent logical structure, physical layout and attention to detail. The report adheres to the Report Writing Guide. No or few spelling mistakes.	Good logical structure and physical layout. The report adheres to the Report Writing Guide. No or few spelling mistakes.	Acceptable structure and physical layout. The report adheres to the Report Writing Guide. Some spelling mistakes. Some errors in referencing.	Unacceptable structure and physical layout. The report does not adhere to the Report Writing Guide. Numerous spelling mistakes. Errors in referencing.	Very little structure and physical layout. The report does not adhere to the Report Writing Guide. Numerous spelling mistakes. Errors in referencing.

## Oral Presentation Assessment Criteria

Criteria	Excellent (5)	Good (4)	Satisfactory (3)	Unsatisfactory (2)	Poor (1)
Introduction (15%)	Provides a comprehensive overview of the presentation and objective[s] of the project.	Provides a good overview of the presentation and objective[s] of the project. Some points not clearly presented.	Provides a general overview of the presentation and objectives of the project but lacks clarity	Provides a limited overview of the presentation and objectives of the project but lacks clarity.	Provides little or no overview of the presentation and limited or no objectives of the project.
Content Quality (20%)	Demonstrates comprehensive knowledge of the problem. Analyses are shown in a systematic and creative manner with assumptions, process and results clearly shown.	Demonstrates good knowledge of the problem. Analyses are shown in a systematic manner with assumptions, process and results shown.	Demonstrates some knowledge of the problem. Analyses are shown but some missing information about assumptions and process.	Does not demonstrate the knowledge of the problem. Analyses are shown but missing information about assumptions and process.	Does not demonstrate the knowledge of the problem. Analyses are poorly presented.
Conclusion (15%)	The analysis of the work conducted highlights comprehension and shows insight into the significance of the results. Concise and appropriate conclusions, excellent and valid response to questions.	The analysis of the work conducted demonstrates good comprehension. Good conclusions, appropriate and valid response to questions.	The analysis of the work conducted demonstrates some comprehension. Reasonable conclusions, appropriate and reasonable response to questions.	The analysis of the work conducted demonstrates limited comprehension. Unreasonable conclusions, barely appropriate and valid response to questions.	The analysis of the work conducted demonstrates no comprehension. Invalid conclusions, barely appropriate and valid response to questions.
Visual Aids quality (20%)	Slides easy to read with appropriate sized graphs, wording etc and no errors on slides. Creative slides.	Slides easy to read with appropriate sized graphs, wording etc and only minor errors	Slides legible but with some errors in formatting, wording, sizing etc.	Slides difficult to read.	Slides inappropriate with major mistakes.
Verbal Presentation (30%)	Clear presentation, presented with confidence and enthusiasm, well structured so that it flowed . Kept to time, good engagement with audiences (good eye contact)	Clear presentation, slight lack of confidence, structure slightly erratic. Kept to time, reasonable engagement with audiences (some eye contact)	Reasonable presentation that ensures the audience was informed of the topic, some structure used. Kept to time, limited engagement with audiences (reading from notes with little eye contact)	Presentation difficult to follow due to erratic structure. Kept to time, no engagement with audiences (reading from notes with no eye contact)	Poorly presented with little or no structure. Not kept to time, no engagement with audiences (reading from notes with no eye contact)

Additional points (bonus) will be awarded considering the nature of the problem (difficult problem or easy problem), depth of the interpretation, concerted efforts among members and other appreciable efforts shown in the report and presentation.

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**Term Project Group and Topics Selection Form**

1. Member of the group

Name	Student ID number

2. Title of the Project:

3. Brief Description of the Scope and Content of the Project (about 400 words)

Please submit this form to [kbmin@snu.ac.kr](mailto:kbmin@snu.ac.kr) by 25 Sept 2009. Late submission will not be accepted.

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### **Instruction on writing progress report**

Literally, the progress report is prepared to 'report the progress'. Imagine that you are working for a company and think of a situation when you report to your supervisor about the progress of your project that you have been doing. Your supervisor will want to know whether you are doing the work properly. Information your supervisors are interested in includes;

- the work that has been done so far
- any issues that has to be resolved at this stage
- rough outline of final outcome of the project
- time line until the completion of the project

In real world, it happens that the funding given to your project is cancelled due to the lack of progress. Obviously you don't want that to happen. The progress report needs to show that the work that you are doing is promising.

This progress report should also help you carry out project. Progress report is a good way to force you to have more concrete refined action plan. Much of writings from progress report can be used for final report.

We don't have a particular format for this submission but I would like you to present the following items in your progress report.

- table of content of final report
- objective of the project - this now needs to be more clear than proposal
- background (introduction) -this part can be useful for your final report
- major achievement (work that has been done so far) - show that you have been working
- work scheduled (including time line of the project) - show what needs to be done by when
- division of duties and responsibilities among members
- issues raised during the preparation of the term project - mention the problems you have encountered and explain how you have solved them or how you are going to solve them
- references (more than five)

Your progress report will be marked based on the clarity of your report addressing above items and the quality of major achievement. Finally, this doesn't have to be 5 pages long. Please submit the progress report via email.