4190.409 Compilers

Course Syllabus and Organization

CSE 컴퓨터공학부
Department of Computer Science & Engineering

Teaching Staff

- **Instructor** Bernhard Egger
  bernhard@csap.snu.ac.kr

  Office Hours Tuesdays, 8 – 11:30 in my office (301-403)

- **TA Team** Hochan Lee (main TA)
  Changmin Ahn
  compiler@csap.snu.ac.kr

  Office Hours Mondays & Wednesdays, 9 – 11:30
  in the CSAP lab (301-419)

Course Organization

- **Lecture**
  - higher level concepts
- **Exercises**
  - every now and then
  - practice knowledge covered in class, small assignments
- **Term Project**
  - provide in-depth understanding of compiler construction by building your own compiler from scratch
  - split into several sub-projects
- **Exams**
  - two theoretical exams after 1/3 and 2/3 of the semester
  - test your understanding of compiler theory and practice

Course Logistics

- **Communication**

eTL	the main channel of communication is through the course website on eTL. Check that site often and regularly! We consider all information posted on eTL read within three weekdays.
Email/SMS	in certain cases we may use eTL's email/SMS functionality to transmit important information to you. All emails/SMS sent to your email address/phone number are considered read within one weekday. **→ make sure your email address/phone number in eTL are correct. While you're at it, please also upload a current picture.**
Emails to Instructor/TA	use the course email (compiler@csap.snu.ac.kr). You can expect an answer within one weekday.

Course Webpage

- **SNU eTL (e-Teaching & Learning):** http://etl.snu.ac.kr/

- **Course website** http://etl.snu.ac.kr/course/view.php?id=109902

  until all late enrolments have been processed, the course materials are also available at the following address http://csap.snu.ac.kr/cc-ss16

- **Materials posted** lecture slides, exercises, projects, scores and grades

  no handouts in class; download/print what you need from the course webpage.

- **Discussion boards** use the discussion boards on the course website for questions or email the TA

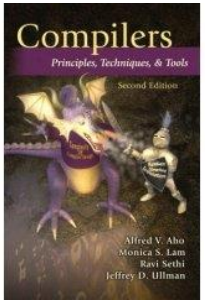
Lectures

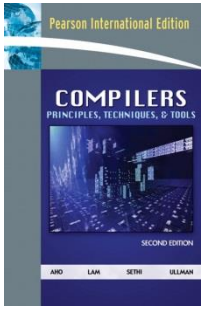
- **Time/ Location** Mondays, Wednesdays 14:00 – 15:15 in room 302-106

- **Textbook** The Dragon Book

  “Compilers: Principles, Techniques, & Tools”
  Alfred Aho, Monica Lam, Ravi Sethi, Jeffrey Ullman,
  2nd international edition, Pearson, 2007

  → available at the university’s bookstore





Exercises

- handed out every 1~2 weeks
- solutions will be posted on eTL
- no submission required

Term Project

We will implement a small but fully-functional compiler by the end of the semester. This project will be broken up into several sub-projects with separate deadlines.

- **Teamwork** — you may work in teams of two or alone.
- **Submission** — electronic
- **Project Presentation** — at the end of the semester
- **Late Policy** — 5 grace days for the *entire semester*.
  Once grace days are used up, there is a
  20% score deduction per additional day
  Tip: don't spend all grace days on the first project!
- **Force Majeure** — serious illness, death in family, …
  talk to me to work out a plan how to get back on track

Exams

- **Two exams**
  - after 1/3 and 2/3 of the semester
  - no final exam
- **Test your understanding of compiler theory and practice**
  - blindly memorizing stuff will not help. Understand the concepts, and you will be fine.
- **Exam logistics**
  - 45 minutes
  - closed book
  - one A4 page (front + back) of *handwritten* notes (original, no copy) allowed
  - answers in *English only*

Attendance & Participation

- **Attendance**
  - not enforced. You are old enough to know what is best for you.
  - *however*, since we are required by the university to keep track of attendance, if you are absent you have to send an email to the TA before the class begins
  - attendance has absolutely no influence on your grade
  - attend to listen and take part in the lecture
  - please be on time

- **Participation**
  - very much encouraged
  - participation tracking: chocolate paper score

Attendance

- We may reconsider our policy if the classroom starts looking like this…

Grading

- **Grading**

Term project	60%
1st trimester exam	20%
2nd trimester exam	20%
Participation in class	5%
Total	105%

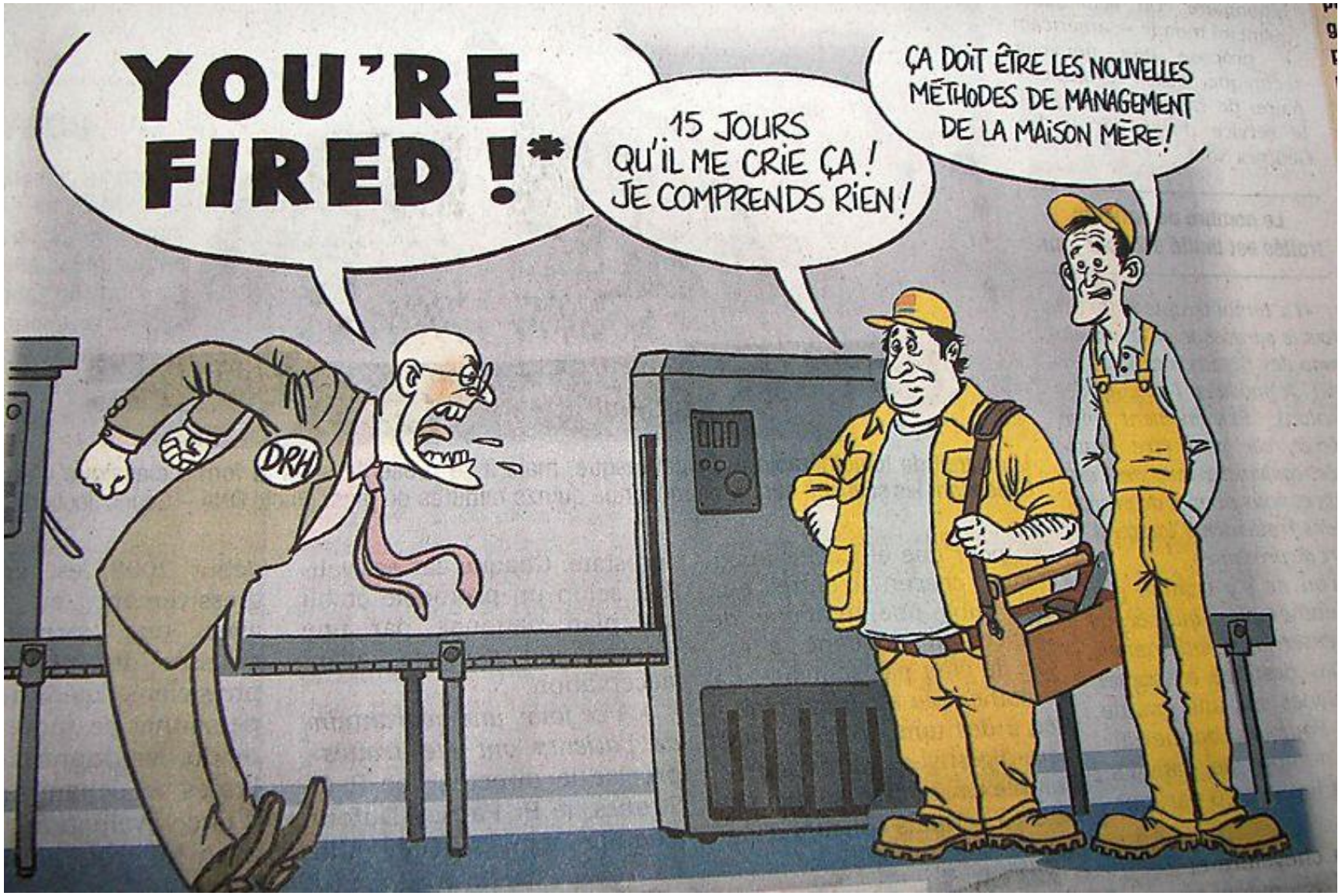
Cheating

- **Cheating is**
  - sharing code
  - copying code from somewhere (previous courses, Internet, …)
  - helping your friend to write an assignment/lab, line by line
  - seeking/receiving/giving any kind of help in exams

- **Penalty for cheating**
  - removal from course with “F” mark
  - notification to department/university

- **If an assignment/lab is too hard for you**
  - ask a colleague to explain the concepts
  - send an email to the TA and have him/her explain things

Language



source: http://lost-tans.blogspot.com/

A Word of Advice

- **Computer Architecture is hard**
  - a tiny mistake/oversight can lead to incorrect behavior
- **Programming requires 10% talent, 40% knowledge, and 50% experience**
  - take every opportunity you have to gain experience (homework assignments, labs, your own ideas, …)
- **This course is hard and requires a lot of time/effort**
  - read the book *before* coming to class
  - unfortunately, I cannot read minds. Ask if you don't understand!
  - start the projects early and ask if you have difficulties

On the positive side: at the end of this class, you will understand how a CPU works and as an added benefit become a better programmer

Course Schedule

Week	Date	Lecture Topic	Term Subproject DL
1	03/02 (Wed)	Introduction to Compilers	
2	03/07 (Mon) 03/09 (Wed)	The Frontend: Lexical Analysis	
3	03/14 (Mon) 03/16 (Wed)	The Frontend: Syntax Analysis	Scanner
4	03/21 (Mon) 03/23 (Wed)	The Frontend: Syntax-Directed Translation	
5	03/28 (Mon) 03/30 (Wed)	The Middleware: Intermediate Representation 1st trimester exam	Parser
6	04/04 (Mon) 04/06 (Wed)	The Middleware: Semantical Analysis	
7	04/11 (Mon) **04/13 (Wed)**	The Middleware: Data-flow analysis **no class (election day)** → Wednesday, June 15, 2016	AST & Type Checking
8	04/18 (Mon) 04/20 (Wed)	The Backend: Runtime Environment & Instruction Selection	

This is a plan. No plan survives contact with reality.

Course Schedule

Week	Date	Lecture Topic	Project
9	04/25 (Mon) 04/27 (Wed)	The Backend: Register Allocation	
10	05/02 (Mon) 05/04 (Wed)	The Backend: Instruction Scheduling	Data-flow analysis
11	05/09 (Mon) 05/11 (Wed)	2nd trimester exam	
12	05/16 (Mon) 05/18 (Wed)	Advanced Topics: Machine Independent Optimizations	Register allocation
13	05/23 (Mon) 05/25 (Wed)	Advanced Topics: Machine Independent Optimizations	
14	05/30 (Mon) 06/01 (Wed)	Project Presentations	Final compiler
15	**06/06 (Mon)** 06/08 (Wed)	**no class (현충일)** → Monday, June 20, 2016 Project Presentations	
16	06/13 (Mon) 06/15 (Wed)	Project Presentations Make-up Classes	

This is a plan. No plan survives contact with reality.

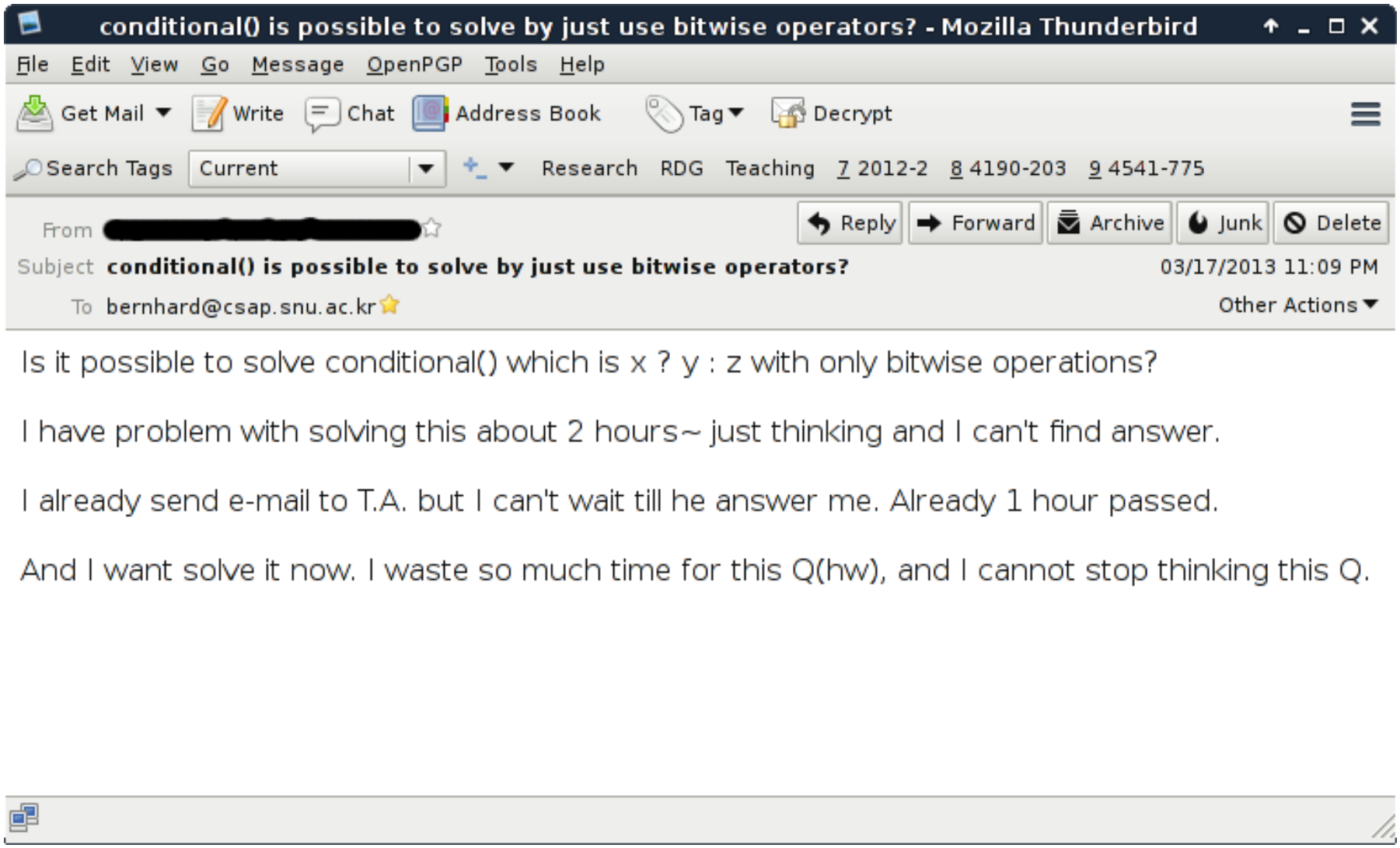
Classroom Etiquette

Dos and Don’ts

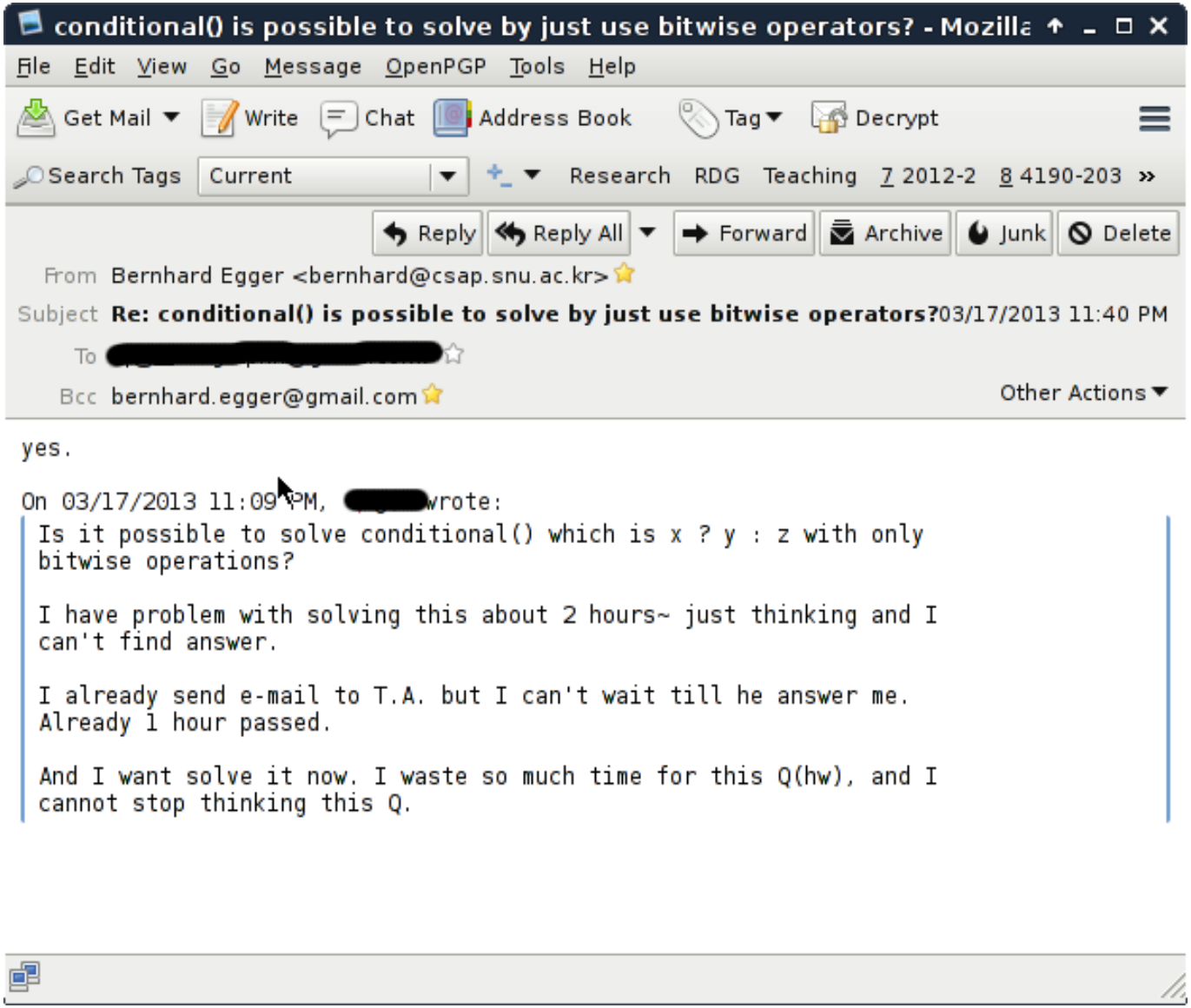
- Dos
  - come to class **to listen, learn, and participate**
  - turn your **mobile phone off/on mute and put it away** during class
- Don’ts
  - **no food** allowed in the classroom
    - exception: exams
  - **no hats, baseball caps**, and any other head cover
    - exception: cover for religious reasons
  - **don’t use your tablet, laptop**
    - except to follow the lecture

E-Mail Etiquette

Student Bashim Cho's Question



My Answer



Don’ts

- **Meaningless subjects**
  - “URGENT”
  - “I need help”
- **Empty body**
  - Subject: Need help with the data lab
- **No/impolite greetings, salutation**
  - Hi, prof!
- **Smileys, emoticons, excessive use of punctuation, etc**
  - Help me please ^**^ ☺ ORZ…..!!!!
- **Expecting an answer within 1 hour**

Dos

- **State your name, student-number, and class**
- **Use a meaningful subject**
- **Be polite**
  - salutation
    - Dear Prof. Egger
    - Dear TA
  - greetings
    - Best,
Cheolsoo Lee
2014-12345
- Write some content!

Sample Mail

- **Example**

  [CA] Question regarding Homework #3

  Dear TA,

  I have tried to download the paper as instructed in the handout, but the link to the external material in homework #3 seems to be broken. Could you please check? Thank you!

  Best regards,
  Cheolsoo Kim
  2014-12345

- **You may email us in Korean**