



ROYAL INSTITUTE
OF TECHNOLOGY

From Teaching to Learning through Coaching (TLC) – Experience from Three Master Level Engineering Courses

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Outline

- Introduction
- Teaching, Learning and Coaching
- How to set a deadline
- Selecting tasks that support learning
- The student's learning experience
- Conclusions

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TLC: An analogy from sports



The role of the coach is to support the development of the athlete by

- Making athletes train regularly
- Selecting harder and harder challenges
- Giving feedback and encouragement
- Encourage team spirit

The role of the university teacher could likewise be stated as

- Making students learn regularly
- Selecting harder and harder homework
- Giving feedback and encouragement
- Encourage teamwork

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Table 1. Simulation course deadlines and grading, fall 2008



| HW | Points | Matlab | CMP | NanoHUB | Deadline | Content |
|----|--------|--------|-----|---------|-----------|---------------------|
| 1 | 10 | Yes | | | Mon 3/11 | Solution ODEs |
| 2 | 10 | Yes | | | Mon 10/11 | FDM 1D |
| 3 | 10 | | Yes | Yes | Mon 10/11 | Diode |
| 4 | 10 | Yes | Yes | | Mon 17/11 | FDM 2D |
| 5 | 10 | Yes | Yes | Yes | Mon 17/11 | Diffusion |
| 6 | 10 | | | Yes | Mon 24/11 | MOSFET |
| 7 | 10 | Yes | | | Mon 24/11 | FEM, Sch-G |
| 8 | 10 | Yes | | Yes | Mon 1/12 | Transport, Scaling |
| 9 | 10 | | | Yes | Mon 1/12 | Ballistic transport |
| 10 | 10 | Yes | | | Mon 8/12 | Monte Carlo |

Homework should be emailed on the date above at 23.59 latest, with your name as filename.

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Table 2. Device course deadlines and grading, spring 2008



| What | Points | Deadline | nanoHUB | Content |
|-------|--------|--------------|---------|----------------------------|
| HW 1 | 5 | Mon 31/3 | - | Basics |
| HW 2 | 10 | Mon 7/4 | - | Scaling/High K |
| HW 3 | 10 | Mon 14/4 | - | SOI/FinFETs |
| LAB 1 | 15 | Mon 21/4 | Yes | Scaling of MOSFET |
| LAB 2 | 15 | Mon 28/4 | Yes | Transport models |
| SEM 1 | 10 | Tue 29/4 | - | Article summary and signup |
| HW 4 | 15 | Mon 5/5 | - | Strain/nano/interconnect |
| SEM 2 | 10 | 6, 8, or 9/5 | - | Seminar: presentation + QA |
| SEM 3 | 10 | Mon 12/5 | - | Written summary of seminar |

* A grade > E requires that the student has some points for each area: homework, labs and seminars.

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Grading



| Points | Grade |
|-----------|-------|
| ≥ 90 | A |
| ≥ 80 | B |
| ≥ 70 | C |
| ≥ 60 | D |
| ≥ 50 | E |
| < 50 | Fx |

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Tasks that support learning and avoids plagiarism



- Peer assessment of essays
- Requiring drafts
- Using warming-up tasks

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Table 3. Seminars and homework in the Frontiers course, spring 2008

| Week | Date | Time | Reading plan / Content | Pages | Homework due 10 AM |
|------|--------|-------|--|-------|------------------------|
| 4 | 25-jan | 13-15 | Introduction / Referencing + Plagiarism | | |
| 5 | 1-feb | 13-15 | Gray pages (all sections) / Info searching | 104 | Select topic ("Title") |
| 6 | 8-feb | 13-15 | I Fundamentals / Summarizing | 144 | Article search KTHB |
| 7 | 15-feb | | <i>No Class Meeting</i> | | Summary of article 1 |
| 8 | 22-feb | 13-15 | II Technology and analysis / Abstract | 112 | Summary of article 2 |
| 9 | 29-feb | | <i>No Class Meeting</i> | | Abstract, keywords |
| 13 | 28-mar | 13-15 | III Logic devices / Feedback 1 | 142 | First draft |
| 14 | 4-apr | 13-15 | IV Random access memories / Different sources | 62 | Feedback 1 |
| 15 | 11-apr | 13-15 | V Mass storage devices / Peer review | 76 | Source criticism |
| 16 | 18-apr | 13-15 | VI Data transmission and interfaces / Feedback 2 | 86 | Second draft |
| 17 | 25-apr | 13-15 | VII Sensor arrays and imaging systems + VIII Displays / Final version | 126 | Feedback 2 |
| 19 | 9-maj | 13-15 | Essays | 852 | Final essay |

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Conclusion



- The coaching involves setting clear grading criteria, and selecting tasks of proper difficulty, at suitable time, and giving prompt feedback.
- My experience is that adding more work for the students seems to improve learning.