

# Research Education at Faculty of Information, Mathematics and Electric Engineering

## 2010 Annual Report for PhD Candidates and Supervisors

*"My supervisor is very active and is always available for discussion. Due to regular/Ukentlig group meetings, I get chance to discuss my progress with him and with other members of our group. We also discuss the most recent research developments related to my thesis."*

[Quote from a Candidate report, 2010]



### PREFACE

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The Faculty wish to continuously improve our facilitation of the PhD programmes. The annual progress reporting is partly a survey of doctoral candidates' progress that may provide the basis for improvement for the individual, and partly an effort to collect experiences from our research education to provide a basis for general improvements at Department or Faculty level.

PhD candidates have expressed their satisfaction with the research training and the quality of this, but they do also point at potentially improvements that will have a positive impact on individual candidates and the research communities. PhD candidates and supervisors have given the Departments and Faculty a basis for further quality improvement.

This summary is a contribution to present transparency in an interesting and challenging research education. It may be interesting and inspiring for PhD candidates and supervisors to look at themselves in relation to others within the research education.

The Faculty Research Committee will focus on the feedback from doctoral candidates and supervisors in the continuous quality improvement in our research programs.

**Bjarne E. Helvik**  
Vice Dean for Research

# 1 Introduction

All PhD candidates and their supervisors shall annually - by the first of March - report on progress in their research education.

The Departments, Head of Department and their representative in the Faculty Research Committee, have considered the reports both regarding individual follow-up and in regards to measures for monitoring the general nature of the Department or research education program in order to achieve an improvement of the quality.

## 1.1 Annual reporting procedure

The annual report from the PhD candidates and supervisors is intended to view the status of our research education. The main purpose is to provide a picture of the reality as seen by the primary stakeholders in order to promote improvements to the individual, research groups and to learn from each others experiences. Discrepancies in the form of lack of progress, challenges related to guidance, academic and social integration, or ethical issues are handled to provide a basis for improvement.

The annual report provides a basis for performance reviews. Departments are responsible for following up the individual employee at the individual level, and implementation of improvement measures. The annual reporting procedures by the IME Faculty are presented in Figure 1.

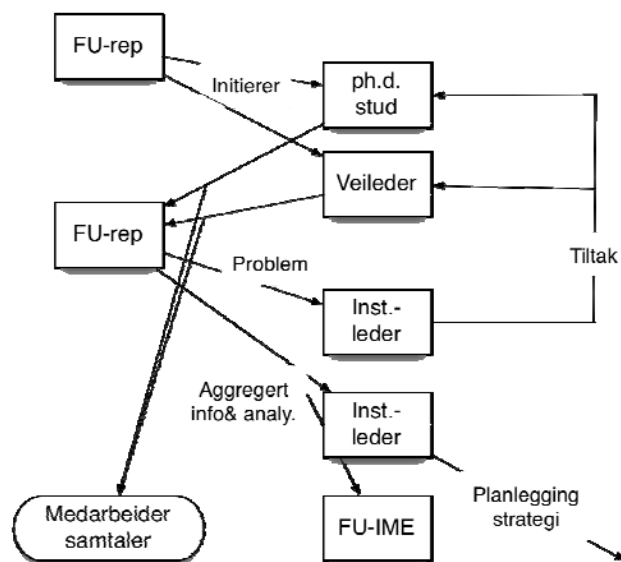


Figure 1: Annual reporting procedures at the IME-Faculty

## 1.2 Feedback

The annual reporting was announced by email to all PhD candidates and announced through the regular communication channels, e.g. letter to the Departments, and at "innsida" (website). 2 reminders were carried out in the same channels. The Faculty received, in addition to the online annual reports, 8 reports in traditional paper form or "own" format.

The data for the report is 330 reports from the PhD candidates and 261 reports from the supervisors. The data are compared with data from common student data system (FS), on 6th of May 2010. The number of registered PhD candidates in FS was 418. These have the right to study.

- **The total of PhD candidates were 423.**

Figure 2 illustrate the number of PhD candidates in the bar graph, by year admitted. 60 PhD candidates at the Faculty were admitted before 2004. In the figure, the admission, completed and terminated PhDs per year are included (FS). One of the main challenges is to distinguish between those who are active in their research education (fully or just partly), those who are having a temporarily break in their studies (with or without leave), and those who have actually completed training without yet had to defend their dissertation. Last ponder may be removed from the FS register.

PhD candidates per 2010: Admission, Completion, Termination at the IME Faculty for the period 2002-2009 (FS)

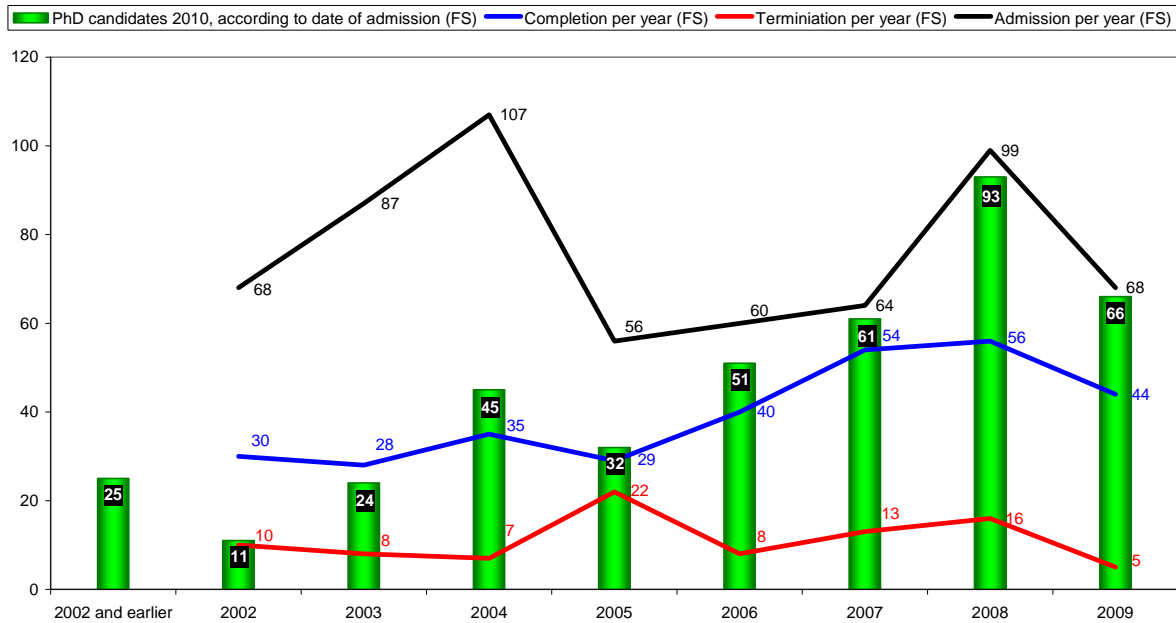


Figure 2: PhD candidates per 2010 and keyfigures for 2002-2009 (FS)

In total there are 60 candidates admitted before 2004, this represents 14% of the total existing student group. 7 candidates (12%) in this group have or will complete during the first semester of 2010. There are no reports for 28 of the candidates (47%) recorded before 2004.

In Figure 3 the number of graduates by Department is compared with the number of reports, respectively from PhD candidates and supervisors.

- The response rate for the PhD candidates is 78% and for supervisors 62%

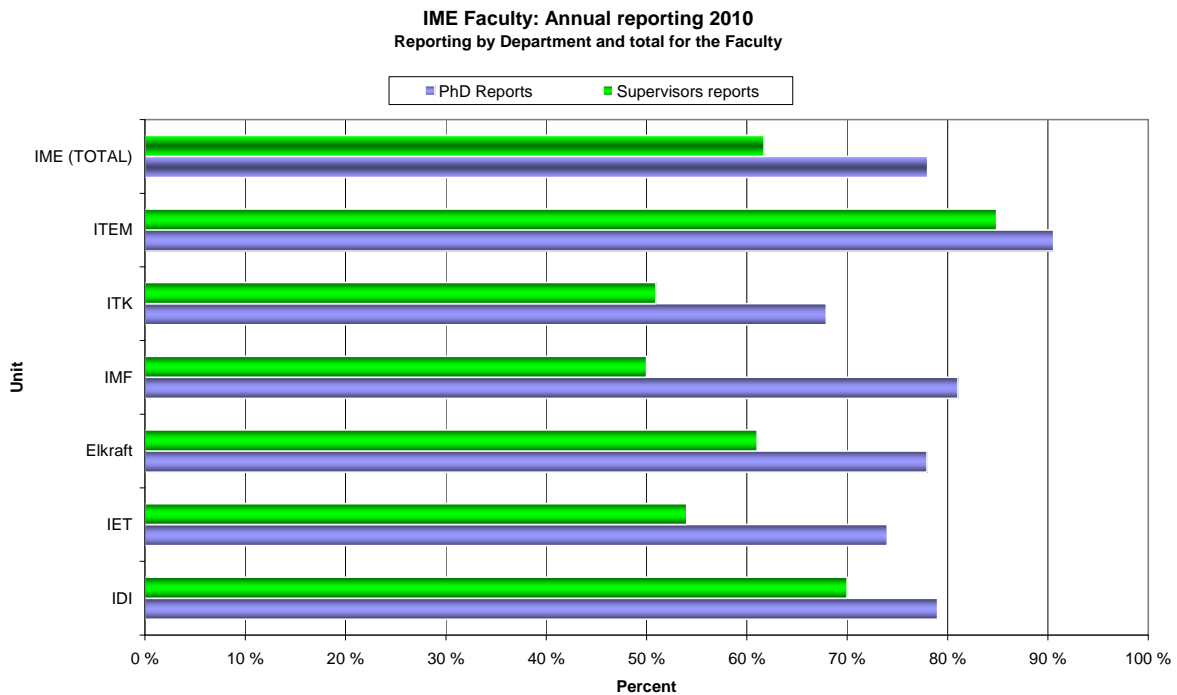


Figure 3: Annual reporting 2010 – PhD and supervisors reports

Figure 4 illustrates that in 55% of the cases the Faculty received reports from both candidates and supervisors, while in 29% of the cases a report was received from either one of the parts. For 1/6 of the candidates the Faculty did not receive any report. There are variations between Departments, and in relation to the share of supervisor and candidate reporting.

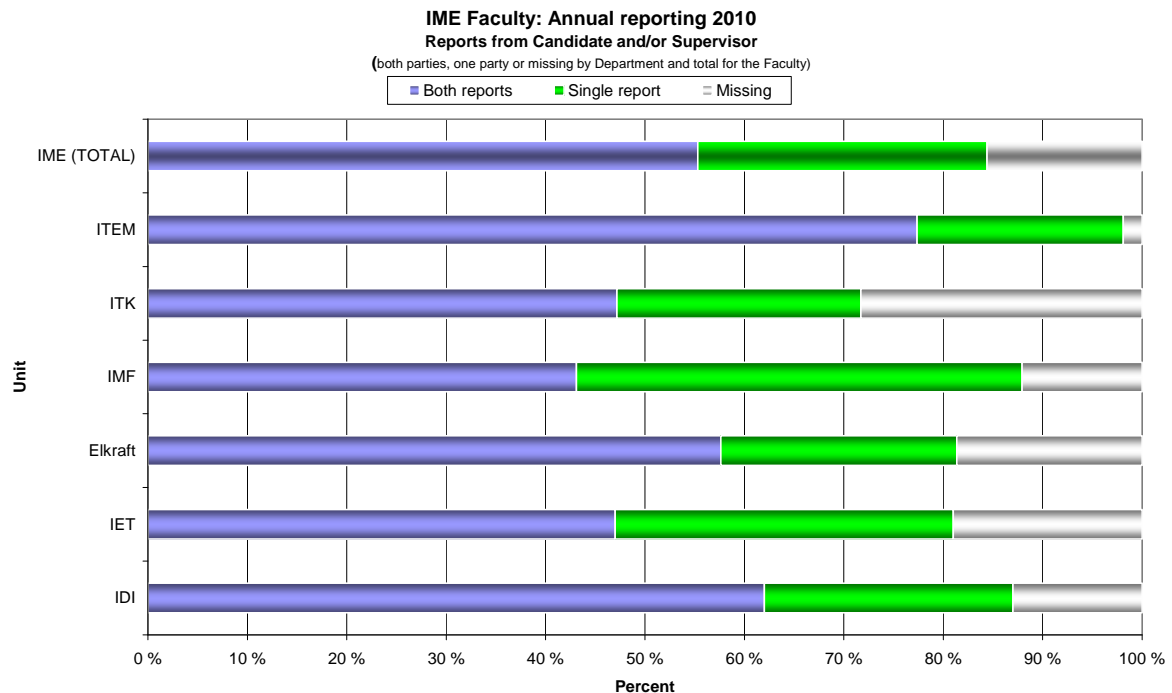


Figure 4: Annual Report 2010 by Department and by reports from candidate and/or supervisor

## 2 Annual Report 2010 - Results

This report is based on 330 reports of doctoral candidates and 261 reports from supervisors.

### 2.1 Starting the studies

#### 2.1.1 PhD introduction seminar and research plan

PhD students are important for the recruitment of well qualified academic staff and a cornerstone in the research activities of NTNU. Experience has shown that there are some challenges related to the initiation of the study, the continued research activities and process of writing up the final thesis. Faculty of Information Technology, Mathematics and Electrical Engineering is therefore trying to improve the procedures for the start-up as well as the continued progress evaluation of the PhD studies. Important activities in this process are to:

- provide the students with important background information
- start the process of reflection on required activities, possible challenges and priorities in completing a PhD degree at NTNU
- strengthen the procedures around the preparation of a research plan, in order to facilitate the continued research work and to finalize the thesis

The survey shows that:

- **73% of the candidates (that is admitted in the period July 2008 to February 2010) has participated in the PhD introductory seminar arranged by the Faculty**
- **85% of the candidates has approved research plan**

The Faculty has since spring 2009 completed [introductory seminar](#) four times. The introduction seminar addresses several issues that the candidates point to as important for their start-up and progress e.g.:

- Clarification of the institution's expectations and obligations
- Writing courses are called for by the candidates and proposed by supervisors, both in terms of language and scientific publishing
- Social / professional activities called for in addition to information about practical arrangements for new students called for, especially important for foreign students

### 2.1.2 Guidance

The Departments have different practices with respect to the number of supervisors for each PhD candidate. At the Department of Computer and Information Science states 4 of 5 candidates that they have 3 or more supervisors. At the Institute of Mathematical Sciences, approximately the same share of candidates has one of two supervisors. Regarding the other Departments, the majority of the candidates have two supervisors.

- More than 70% of the PhD candidates have 2 or more supervisors

It is a good match between the candidate and the supervisor's perception of the frequency of guidance and academic discussions.

- **50% of the candidates have weekly guidance**
- **25% of the candidates have monthly guidance**
- **15 PhD candidates (5%) responded that the guidance was not satisfactory**

The candidates expressed foremost their positive experiences with the guidance, but did also point at the potential for improvement:

- Good follow-up and feedback by handing in written work in advance
- Discussion of articles and curriculum provides good feedback and good outcomes for further research
- It may be useful to establish a reference group among the PhD candidates
- Some candidates express a wish for additional co-guidance related to their professional proximity and geographical proximity of the main supervisor. Candidates also expressed a wish for specific feedback or "confirmation" on the quality of their research work

Feedback provided from the PhD candidates is very good. Supervisors points to the challenge of motivating candidates to complete their studies when the funding period has expired, especially if the candidates are employed. In few cases there has not been any contact between the supervisor and candidate in the past year.

- **Supervisors express that the collaboration related to guidance is not satisfactory in 17 (7%) of the cases**

Seminars are mentioned as a possible measure to improve integration in the academic environment. A few supervisors' points at the challenge of many imposed tasks and may for this reason feel that they are the "bottleneck" in terms of providing student feedback.

### 2.1.3 Ethical issues related to research work

It is important that candidates who are or think they will come up in an ethical dilemma regarding their research as quickly as possible consult their supervisor, Department or Faculty.

- 6 PhD candidates (2%) answered that they have or see it as likely that they in the coming year may rise an ethical dilemma related to their research.

### 2.1.4 Midway evaluation

Midway evaluation is offered by two Departments at the Faculty, Department of Computer and Information Science (IDI) has since 2004 experience with this evaluation form. The Department of Telematics (ITEM) introduced the evaluation form in 2007.

## 2.2 Academic training

Within the PhD candidate groups, 61% responded that they have successfully completed all courses in the academic training. In the case of delays the candidates pointed to several factors, e.g.:

- Leave of absence (maternity/paternity leave)
- Illness,
- More work than expected work with the "duty work" requirement,
- Postponed exams for individual courses (e.g. due to sabbatical leave), or that individual courses are not passed with a credit of B or better.

### 2.2.1 PhD candidates evaluation of the academic training

In general, the PhD candidates consider that the training component provides broader competences, that it is relevant for their thesis, and that the quality of the academic training is high.

Our graduates' assessment is positive, cf. Figure 5. Related to figures from previous related studies on fellow members of The Norwegian Association of Researchers (Forskerforbundet) in the fields of Mathematics and Natural Sciences, MN, (n = 177, within technology there were only 15 respondents in the sample and therefore not included) and in relation to members at NTNU (n = 165) (Source: NIFU STEP Report 38/2009).

- **84% of the candidates strongly or partly agreed that the educational component provides broader competences**
- **75% of the candidates strongly or partly agreed that the academic training given is relevant for their thesis**
- **79% of the candidates are strongly or partly agreed that the quality of the training component is high**

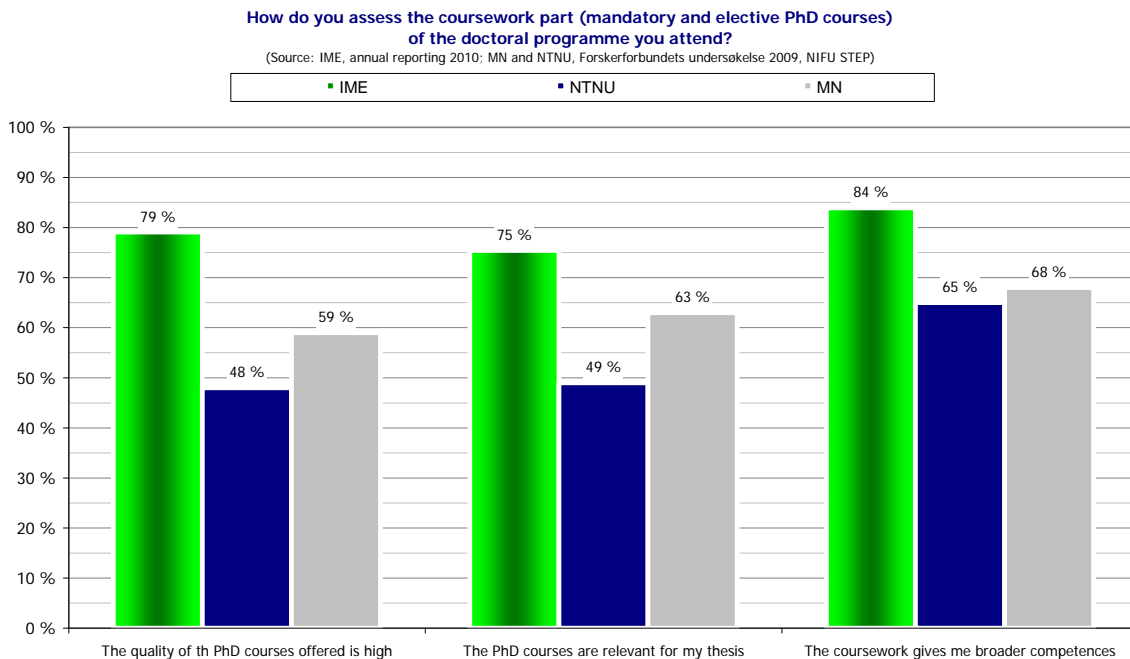


Figure 5: PhD candidates' assessment of own academic training

5% of the PhD candidates strongly or partly disagree that academic training provides broader competences. 13% feel strongly or partly that the training component is less relevant for their thesis. 9% are strongly or partly disagree that the quality of the training component is high. Recently admitted candidates have answered "Not relevant/too early to tell".

### 2.2.2 The PhD candidates experience

The PhD candidates were asked to consider a number of statements regarding their doctoral/fellowship period to date. The result of this is shown in

Please respond to the following statements regarding your doctoral/fellowship period to date?  
So far I, have...

(Source: IME, Annual Report 2010; Survey for The Norwegian Association of Researchers 2009, NIFU STEP Report 38/2009)

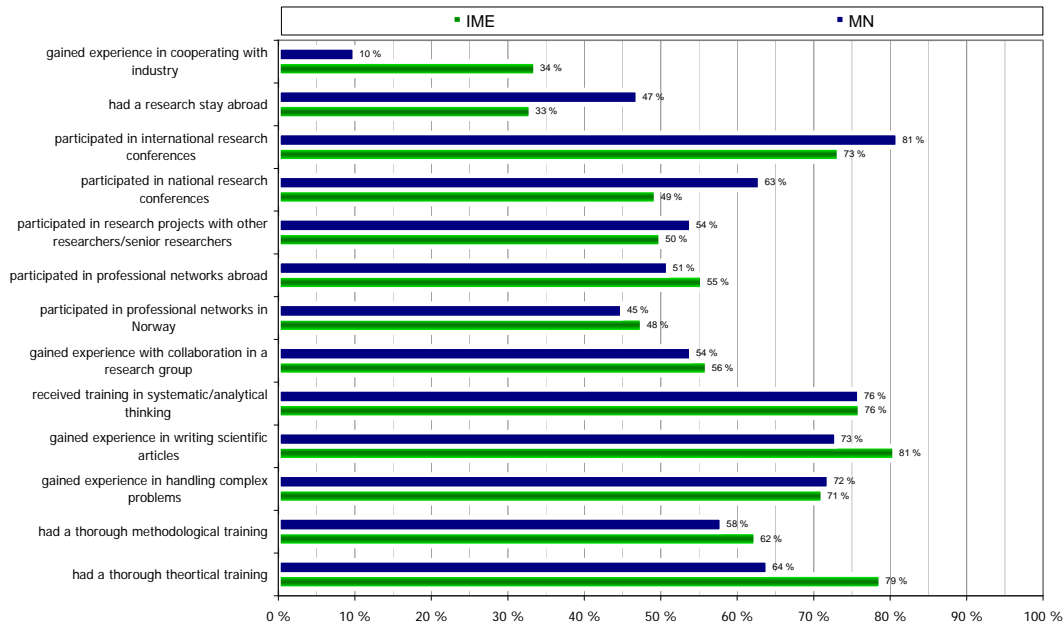


Figure 6. The results are comparable with the related previous studies on fellow members of The Norwegian Association of Researchers (Forskerforbundet) in the fields of Mathematics and Natural Sciences (Source: NIFU STEP Report 38/2009).

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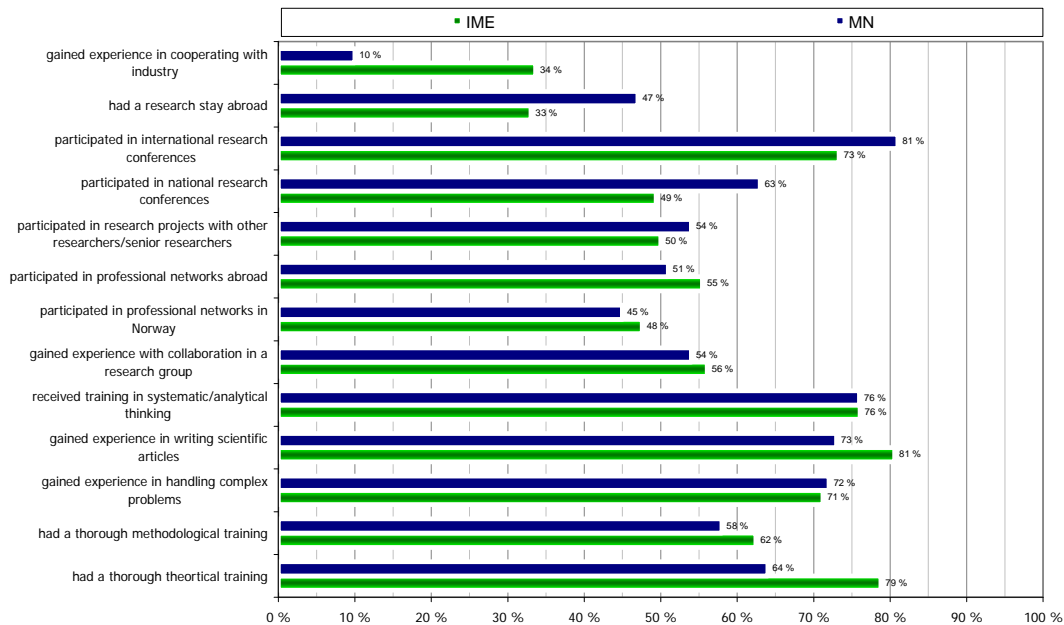


Figure 6: Experience of the candidates doctoral/fellowship period to date

- 79% of the candidates strongly or partly agree to had a thorough theoretical training
- 62% of the candidates strongly or partly agree to had a thorough methodological training
- 71% of the candidates strongly or partly agree to had gained experience in handling complex problems

- 81% of the candidates strongly or partly agree to had gained experience in writing scientific articles
- 76% of the candidates strongly or partly agree to had received training in systematic/analytical thinking
- 56% of the candidates strongly or partly agree to had gained experience with collaboration in a research group
- 48% of the candidates strongly or partly agree to had participated in professional networks in Norway
- 55% of the candidates strongly or partly agree to had participated in professional networks abroad
- 50% of the candidates strongly or partly agree to had participated in projects with other researchers/ senior researchers
- 49% of the candidates strongly or partly agree to had participated in national research conferences
- 73% of the candidates strongly or partly agree to had participated in international research conferences
- 33% of the candidates had a research stay abroad
- 34% of the candidates strongly or partly agree to had gained experience in cooperating with industry

### 2.3 Publisering

The IME Faculty account for a fifth (19.2%) of the total output of publication points at NTNU. Figure 7 illustrates the line of production at the IME Faculty from 2005 to 2009. The bars show the Departments' output in the same period. Department of Mathematical sciences share of publishing on level 2 (top level) is up to 35%. The other Departments' share of the publication points at level 2 is between 5 - 15%.

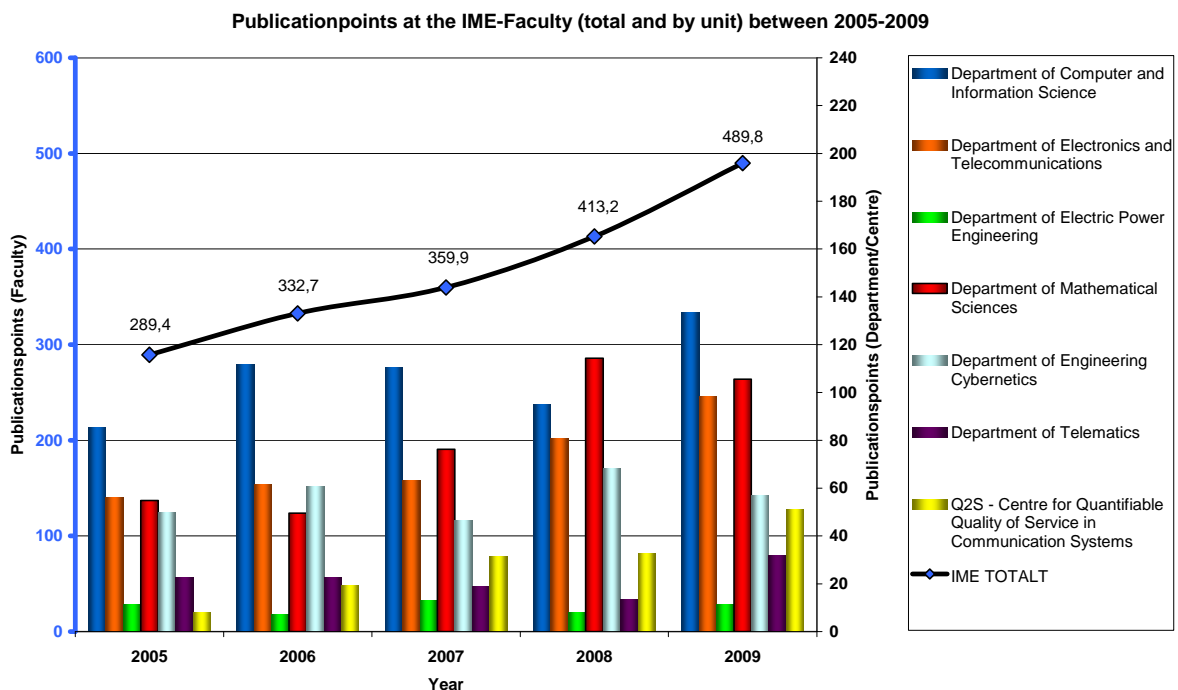


Figure 7: Publicationspoints at the IME Faculty from 2005 to 2009

The annual report shows that between 73-85% of the PhD candidates in their second to fifth years after admission has published in the last calendar year. Approximately 30% of PhD candidates with admission in 2009 and 2010, published in the last calendar year. However only a very few candidates have submitted their list of publication list as asked for in the annual report.

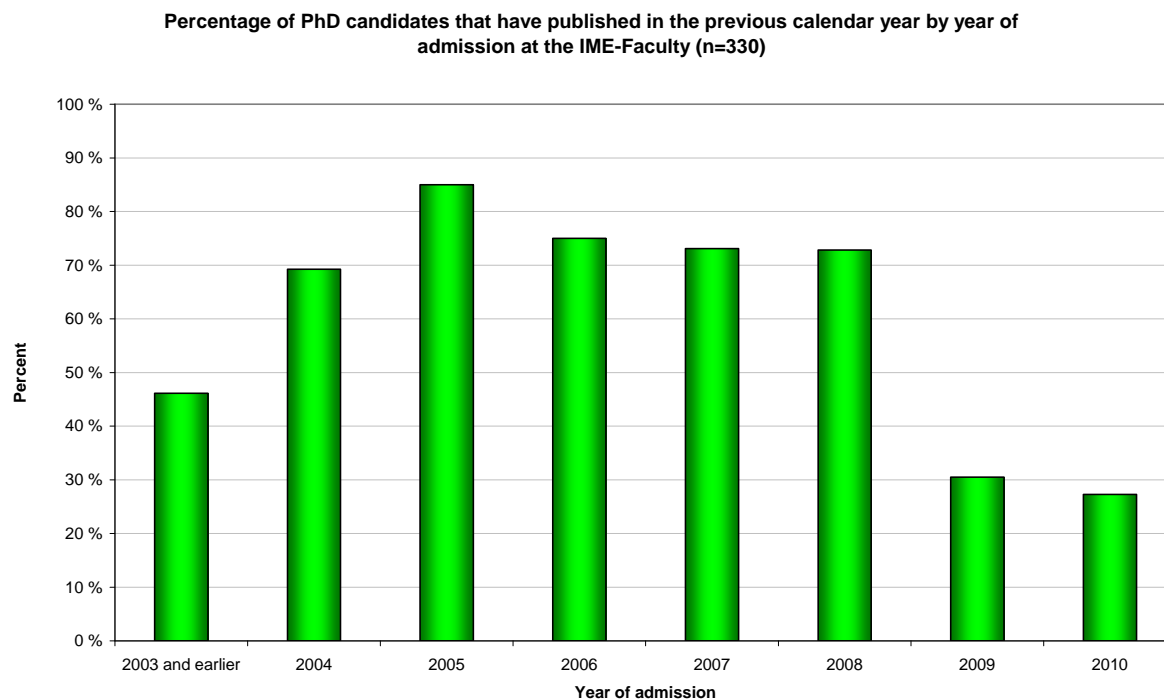


Figure 8: PhD candidates with published work in 2009 by year of admission.

## 2.4 Completion and funding

78% of the candidates respond, according to the annual reporting, that they work full-time with the research education. Approximately equally many, 74% answered that they think they will be able to complete the education within the original financing plan. 51 candidates answered that they do not currently have funding for the completion of the study.

### 2.4.1 Individual meeting

The Faculty administration has made initial contact and been in contact with 13 candidates that wished an individual meeting. Two candidates did not answer repeatedly requests either by phone or email. The conversations with the candidates resulted in that the candidates themselves took or would consider whether they should take direct contact with the supervisor or head of Department. A typical meeting lasted between 30-60 minutes.

**- 15 candidates (5%) marked for an individual interview in the annual report.**

## 3 Concluding remarks

The Faculty wishes that the share of reports will be improved with regard to the PhD candidates and supervisor. The annual reports can provide a sound basis for progress and improvements, and contribute to closer monitoring and reflect our activity. All PhD candidates and the supervisors shall deliver individual annual report by the first of March each year, cf. § 9 in the [Regulations for the PhD program at NTNU](#).

PhD candidates are responsible for keeping all information relating to a residential address and email address updated in the [Student Web](#).

The Faculty has initiated ordinary procedures for follow up in collaboration with the Departments and supervisors, e.g. in order to conclude on the candidates' intentions of completion of their research education.

The annual reporting should be developed in cooperation with Departments and Faculty needs. Experiences and suggestions emerged in the annual report provide a basis for improvement.

The wish for writing courses and language courses (both English and Norwegian) are mentioned in several candidate and supervisor reports, in addition to the desire for better learning environment integration, both academically and socially.

Information regarding administrative procedures are a integrated part of the [introductory seminar](#) (Faculty website). Activities for doctoral candidates are announced on the "[innsida](#)".

The research plan shall be approved within 6 months after admission.  $\frac{3}{4}$  of those who have reported that their research plan is not approved is admitted in 2009/2010, while 1/5 started in 2008. A few individuals that started in 2007 and 2006 will be followed up by the supervisor and the Faculty.

It is an opportunity to take advantage of midway evaluation within all PhD programs at the Faculty from the academic year 2010/2011. The Committee for Research and Research Education has discussed the use of midway evaluations, and will follow up in order to describe or point at "best practice" for our learning environments.

Departments are responsible for monitoring each PhD candidate:

- **5% of the candidates have asked for and received individual counseling**
- **Systematic monitoring of the individual Department level**

Information about the research program, e.g. startup, execution and completion of research training is provided and updated continuously on the Faculty website (<http://ime.ntnu.edu/research/phd>).

The annual report emphasizes that it is important to focus on the candidate's association with research groups (both academically and socially), in addition to participation in national or international network. The feedback from both candidates and supervisors will also focus on research dissemination with respect to writing, methodology and language skills. Beyond this, it seems that there are measures for the individual that is vital to their progress and quality.

The Department will appoint a "co- supervisor" for the PhD candidates in the case of sabbatical leave (every 5 years at the IME Faculty). The Department is also responsible for maintaining strong academic groups at campus, and shall carry out a plan for the sabbatical leaves.

The IME Faculty regard it as a strength to have a well established introductory seminar for its PhD candidates, and follow up this fall with a pilot for a two-day PhD supervisor course, in addition to other seminars initiated by Faculty (eg ITovation, IPR seminar series) and Departments.

#### PHD SUPERVISOR COURSE AT A GLANCE

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- Course for PhD supervisors (beta)
  - o Cooperation with UNIPED
- Dates: 6<sup>th</sup> of September and 18<sup>th</sup> of October, 20 participants, participation from all Departments
- Two-days course with project in teams between these dates.
- Experiences supervisors with "best practices" (with good statistics) at the Faculty.

#### PHD INTRODUCTION SEMINAR AT A GLANCE

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- PhD introductionseminar (every semester)
- Important activities in this process are to:
  - o provide the students with important background information
  - o start the process of reflection on required activities, possible challenges and priorities in completing a PhD degree at NTNU
  - o strengthen the procedures around the preparation of a research plan, in order to facilitate the continued research work and to finalize the thesis.