

# Pedagogical map for Jan Ubøe

## My biography – a logical sequence of events

- 1982-1990 Master and PhD student at the Math department, University of Oslo

I started teaching groups in 1982, and liked it a lot. Quite quickly, my groups became crowded. In this early period, I spent endless hours preparing notes, I read scientific papers from the journal Uniped, and invited students to my office for face-to-face teaching. During the semesters, I spent almost all my time on teaching, postponing the major part of my research to off-semester periods. At the end of the period, I had invested many hours in preparation, and rumors that I had a talent for teaching, reached the staff at the Math department. In the last year of my contract, they let me lecture two courses: MA365 (a master course) and MA001 (a bachelor course). This was unusual as only staff gave lectures.

In the student evaluation of MA001, my performance was rated 4.87 (5.0 best possible). See appendix A1-3 for a documentation of the evaluation, and a couple of verbal assessments. In MA365, I introduced fully structured orals exams, which I think was quite innovative at the time, see appendix A4.

- 1990-2000 Associate professor at Stord/Haugesund College

My very first course at the engineering department ended up as a total failure, with about 60% of the students failing the national exam. According to my students, everything seemed very simple when I explained it, but when left alone at the exam they were lost. While painful at the time, it taught me a lesson I should never forget; good lectures do not imply good learning. During the next few years, I took advantage of this experience and developed my own version of collaborative learning. I turned my courses into laboratories of learning where I instantly could see how my students responded to my teaching. For more details, see appendix A5.

- 2000-2013 Professor at Norwegian School of Economics

With 300-400 students at NHH, it did not seem possible to continue my system of collaborative learning, and I returned to conventional lectures. I only kept one fragment of the construction; one week per year, I reserved for collaborative learning. Since the majority of the students at NHH were among the selected few with sufficient talent and discipline to work on the own, this worked reasonably well, and I even won a few teaching awards. During this period, I also gave courses at the University of Oslo and Stord/Haugesund College. In those cases, the number of students were manageable, favoring active learning formats. Awards: «Bronsesvampen V2003, V2008», and «NHH's Pris for fremragende lærerinnsats 2010».

- 2013-2018 Public debate/Professor NHH

I started to write newspaper chronicles on teaching and management at the end of 2013. Some of my chronicles attracted many readers, and I got invitations to talk at several seminars, mostly arranged by "Utdanningsforbundet". In particular, I talked during «Arendalsuka», gave a presentation of my ideas to «The Ministry of Local Government and Modernization», and gave a lecture during the annual presentation of "Kommunal Rapport" which was streamed to every local administration in Norway. See the appendix A6. I also appeared on radio and TV.

In this period I read and commented (on Twitter) a large number of articles on management and education, and it became clear that there were “lots of things going on out there”, and that we, i.e., teachers in higher education, were lagging seriously behind. At one point, I had to ask myself a crucial question: “Is it OK to sit still and do nothing?” Even though I was somehow satisfied with my own performance, the answer was “Certainly not”. For documentation, see @UboeJan on Twitter.

- 2014-2015 [Incorporating a blended learning approach/Professor NHH](#)

Inspired by all the articles I read, I started to upgrade my web page for the statistics course. I included multiple-choice tests for all lectures, and used our film studio to record 5-minute summaries of each lecture. In the fall 2015, the idea of full-scale collaborative learning at NHH had matured sufficiently to come into play, and I spent the major part of the semester to develop a new set of exercises particularly designed for collaborative learning.

- 2016- [Collaborative learning/Professor NHH](#)

I ran my first session of collaborative learning in the spring semester 2016, and it was certainly a success. The previously silent students transformed into a symphonic orchestra of active learners, for the most part so focused on problem solving that they forgot about time. The voluntary attendance was close to 100% for the entire semester, and some students even said it was great fun. The construction has continued to be successful, but not at the same scale. Attendance has dropped due to heavy mandatory workloads in parallel courses, and there is a constant need for revisions and new ideas to counteract this. The students evaluations are positive, and [my rating for 2019 was 4.80](#) (5.0 best possible). [Awards: «Bronsesvampen H2016, V2018».](#)



Me receiving the award “Bronsesvampen” for my course MET 2 in 2018.

The best way to understand my teaching philosophy is to watch my video <https://www.youtube.com/watch?v=Mv8vqMVjZoE>, but if you prefer to read, see below.

**Teaching philosophy**

I strongly believe that the best way to learn mathematics/statistics is by doing, a core element in the philosophy of Dewey (1916). My main idea is to let students work with exercises as soon as possible, and I have invested most of my efforts in developing interesting, relevant, and to some extent challenging exercises. From my experience, even excellent students struggle a lot when they study new material, and to let the students quickly gain momentum it is necessary that the first few exercises are very simple. Only when the basic framework is in place, is it time to move on to more interesting problems.

The literature recommends that we integrate theory and practice, Leinhardt et al. (1995). To motivate further studies I believe students need to see interesting applications from the start. To achieve this, I try to pick bits and pieces of theory that we teach on a higher level, and organize them such that they are suitable for beginners. The students at NHH much appreciate this approach, since they see that statistics is essential to any serious study of economics. Some of the exercises I give are challenging, but complexity is never a goal. Non-trivial problems tend to have non-trivial solutions, and my intent is to present theory in the simplest possible way. Indeed, some of the challenging exercises that have given me the most pleasure have a very simple solution.

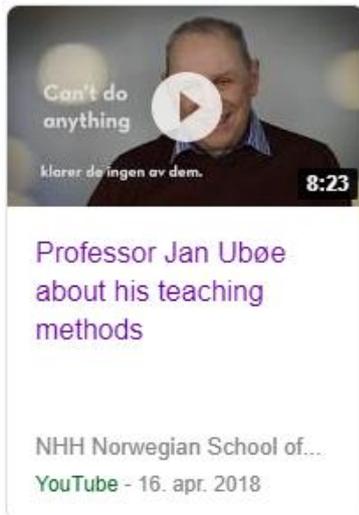
I document my approach in Ubøe (2017), and parts of the passages above are excerpts from the preface of this book. I have divided the exercises in my book into two categories; very simple exercises to gain momentum and more challenging exercises to focus applications. The more challenging exercises are all equipped with a label hinting at what kind of problem in economics we want to address.

My preferred teaching format is collaborative learning, a concept firmly rooted in Vygotsky's zone of proximal development, i.e., categories of things that a learner can learn but with the help of guidance. My approach is consistent with the seven principles for good practice in undergraduate learning as stated by Chickering and Gamson (1987), and while it resembles a flipped classroom, I prefer a blended learning approach. The construction dates back to the early 90s, and originated from an article I read in Uniped. The article reported teaching activities at NTNU, and suggested that we could obtain good results if students solve exercises in mini-groups of four students. Throughout my career, I have used variants of this teaching format at all levels, i.e., bachelor, master, and PhD. The construction has matured over time, and I now equip each problem set with some small excerpts of theory. In principle, the bits and pieces of theory make the problem set self-contained and students are often able to solve these problems with no or very little preparation in advance.

Here are some links documenting my practice:

<https://itslearning.com/global/inspirational/collaborative-learning-norwegian-school-economics/>

<https://www.youtube.com/watch?v=Mv8vqMVjZoE>



The concept is very simple, we can understand it in a few minutes, use it with success after only a few hours, and it takes a lifetime to master it to excellence. Even with 30 years of experience, there still pops up situations for which I have no satisfactory solution.

As mentioned above, a main concern of mine has been to demonstrate that mathematics and statistics have applications relevant to the real world. My interest for applications originated from Gulliksen (1981), where the main idea was to bridge the gap between theory and applications. Tor Gulliksen was by any standard a brilliant lecturer, and his line of approach has been a constant inspiration throughout my career as a lecturer.

An important part of my teaching philosophy is that school is a part of life, and that the wellbeing of students is crucial for efficient learning. Hattie and Yates (2014) write that the teacher-student relationship is probably the most decisive issue for learning to take place. An important part of my dialogue-based teaching is to build a trust relation between my TAs, my students, and me. The format has an important social component, which I strongly believe is beneficial for learning.

The writings of William Edwards Deming, e.g., Deming (1993), have great impact on the way I think about teaching. Deming is widely recognized as one of the leading thinkers of management, and his ideas is the core behind what we today phrase as trust based management, a central issue in the political debate on education and management. Deming was strongly opposed to MBO (management by objective), which penetrates all levels of education today. I have written a significant number of newspaper chronicles discussing Deming's ideas in the context of education; see the section on "Dissemination". Deming writes in his book "*There is no scarcity of good pupils, there is no scarcity of good people.*" He emphasizes that grading and rankings produce artificial scarcity of talent, and that our obsession with rankings is detrimental to efficient learning.

During my time as a student at the University of Oslo, the lack of transparency with respect to learning goals utterly provoked me. You bought a book, should read and understand it, but no information was given regarding what you were supposed to learn. This was particularly awkward during oral exams, where we often had no clue what to expect, i.e., a flagrant breach of constructive alignment as stated by Biggs and Tang (2011). Transparency with respect to learning goals has ever since been a central part of my teaching philosophy. I spend considerable time explaining my students what I expect them to do during the exam, and why I expect them to do this. This practice dates back to the early 90s, see the attachments, which I think was quite innovative at the time. I believe my practice has advantages over a formalized list of learning outcomes, although I admit that such lists have been an improvement to the former practice.

As our world and the technology we use are changing with ever-increasing speed, I believe the near future will produce huge changes in the way we teach students. We must expect that what works today, will not work tomorrow. That calls for a constant need for change, reaching out for new approaches and finding solutions to new challenges.

## Teaching and assessment repertoire

My teaching repertoire is broad and the methods I choose are conditional on how many resources I have available and the overall quality of my students. While I prefer collaborative learning, this format is not always appropriate.

- Lectures

Lectures can work well, but I never think about them as the key component. The efficiency of a lecture-based approach mainly depends on my choice of course material, and the exercises I offer the students. If the course material is sufficiently interesting, and the students sufficiently able, a lecture based approach can lead to efficient learning, but only if the students themselves put in sufficient effort.

- Collaborative learning

When I have sufficient resources and my students are sufficiently able, collaborative learning is my preferred approach. It offers me instant feedback on how my students are doing, and has an invaluable social component as well. The downside is that it is quite expensive in terms of resources (e.g., salaries to TAs) and time spent in the classroom.

- Fully framed constructive alignment

Collaborative learning only works if the students are sufficiently able. For many years, I have been teaching students with particularly weak mathematical background, for the most part P-math from High School. In such cases, collaborative learning does not function well, since these students are unable to help each other. A face-to-face approach is more appropriate. These students need a particularly strong alignment of their coursework. I have obtained very low failure rates (consistently about 5% over many years) using a format where I fully align mandatory assignments with the questions at the exam, for details see the appendix A7.

- Assessment



To assess students I use the traditional Norwegian system with 100% emphasis on the final exam. One exception is at the PhD level, where my students show they are able through lectures they give at the end of the course, and they have no graded exam.

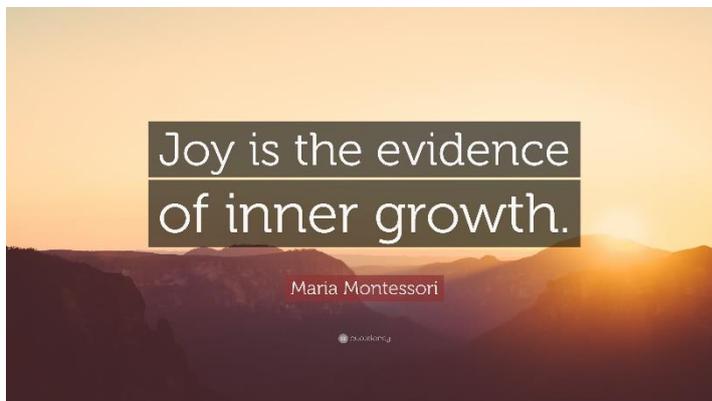
Since Norwegian students put a lot of effort into solving previous exam problems, I take advantage of this providing them with original problems of definite interest to economists. These problems are research based, as they are simplified versions of topics I have been working with in my own research. They cover a wide range of topics, sometimes focussing the most recent public debate. The construction of such problems require much effort, and I may use several days to construct one single such problem. Over the years, I have designed a significant number of problems, and I have collected major parts of them in Ubøe (2017). I have used all the labelled exercises in my book for assessments, and I think they are evidence of efficient learning since they generally require a higher level of maturity than what is common at the bachelor level in Norway.

## Reflections on own educational development

The literature provides us with a mixed and inconclusive picture when it comes to the efficiency of blended learning approaches. Andersson and Logofatu (2017) quote several papers; some provide positive evidence in favor of blended learning, some report comparable results, while others report negative effects. Gillette et al. (2018) conduct a meta-analysis of five different studies, and report minimal gains from flipped classrooms. They argue that flipped classrooms require more time to develop and implement, and warn against widespread adaptation before we have solid evidence in favor of a flipped approach.

With nearly 30 years of experience from active learning, I am not surprised that flipped approaches sometimes fail. There is nothing in the construction per se that automatically leads to success. From my experience, even brilliant students need easy stuff to get started, and introductory exercises in textbooks are often too difficult. To initiate active discussion of the material, it is crucial that the first few exercises are very simple. When I implemented collaborative learning in my beginner course in statistics, I had to develop a completely new set of exercises particularly designed with this in mind.

The discussion in Gillette et al. (2018) raises a few important questions. Can we improve our skills as lecturers if we never interact with students? I think not. I believe that the main takeaway from active learning is that we can see hands on what does and what does not work. During my years in Haugesund, I greatly improved my lecturing skills. As I gained more insights into how my students worked, I was able to improve my own traditional lectures. During my career, most of my colleagues have never worked with students in this way. Some of them are excellent, even winning teaching awards, but it is hard to see how they can improve their skills over time.



As mentioned above, Hattie and Yates (2014) argue that the teacher-student relationship is crucial for learning. A consequence of traditional lectures is that we have no relation at all. Collaborative learning depends on social skills, however, and such skills take time to develop. There is no guarantee that a first attempt will be a success. Building a

relationship is not easy, and in the early part of my career, I did several mistakes. I think I have grown over time, and I have seen shy and timid TAs blossom as human beings. If we favor growth in all aspects of life, active learning is the way to go.

Silence is one of my favorite techniques in lecturing. When I see that my students struggle to maintain focus, I stop speaking for some time, typically 30 seconds or more. McCarthy (2018) quotes research documenting an average downtime (silence) of 0.9 seconds during lectures, and suggest that we need to give our students some time to think. Even a few seconds is documented to have positive effect. A popular myth in teaching psychology is that students have attention spans typically lasting 10-15 minutes, followed by lapses in attention. New research on the topic, Bunce et al. (2010), suggests that lapses are much more frequent, and that attention spans only last for a few minutes. Such frequent lapses in attention is one more point in favor of collaborative learning.

## Supervision

My primary concern has been teaching introductory courses at the bachelor level, and supervision has not been a key component in my teaching repertoire. In the period 1996-2000, I was part of an MSc program in mathematics at the University of Zimbabwe, and supervised five students, mainly via e-mail. At NHH, I have supervised three students at the master level, and three students at the PhD level.

Continuity is a key component in how I think about supervision, and I believe in frequent contact between my students and me.

## Pedagogical materials

During my years at the University of Oslo, I developed a learning aid “Notathefte for MA001”, which continued to be in use for many years. The main idea in the booklet was to compress the course material into a small number of central principles equipped with examples of their use. I later produced similar booklets for several other courses.

As a teacher for my engineering students in Haugesund, I collaborated with Folke Haugland and Arne Stray to write three textbooks:

- Haugland, F., A. Stray and J. Ubøe (1997) *Lineær algebra og diskret matematikk*, NKI-forlaget.
- Haugland, F., A. Stray and J. Ubøe (1999) *Matematisk analyse I*, NKI-forlaget.
- Stray and J. Ubøe (2000) *Matematisk analyse II*, NKI-forlaget.

None of those books became successes, but they provided me with some valuable experience with writing books. A few years later, I published:



- J. Ubøe (2004) *Statistikk for økonomifag*, Gyldendal Akademisk.

According to my publisher, this is one of their most successful academic publications ever, with more than 20000 copies sold. The latest version of this book is now the fifth edition, and Springer has published a modified version in English:

- Ubøe, J. (2017) “*Introductory Statistics for Business and Economics: Theory, Exercises and Solutions*”, Springer.

Gyldendal documented the story behind this book in Vit No. 1, see the appendix A8, or use the link:

[https://issuu.com/gyldendalnorskforlag/docs/vit\\_til\\_issuu/32](https://issuu.com/gyldendalnorskforlag/docs/vit_til_issuu/32)

Vit No. 1 was the first issue of their magazine, and I (as the only invited author) gave a talk about my teaching methods when Gyldendal celebrated the introduction of Vit.

I have also coauthored an advanced textbook:

- Holden, H., B. Øksendal, J. Ubøe, T. Zhang (2010) *Stochastic Partial Differential Equations: A Modeling, White Noise Functional Approach*, Springer.

## Development of teaching aids and materials

As already mentioned in my biography, I have introduced a blended learning approach through my web page on Canvas, see appendix A9, which displays some resources available to my students. I record videos of all my lectures, and from the start of the semester, I publish all the videos from last year. During the semester, I constantly update these videos to the latest versions. With this organization, a student can follow all my lectures through my videos, i.e., a flipped classroom in the classical sense. The majority of my students prefer a mixed approach; they attend some lectures and watch some videos.

The web page contains voluntary multiple-choice tests for all lectures, and 5-minutes summaries of each lecture. The 5-minutes videos appear to be particularly useful for students. About 50% of my students watch each such video, see appendix A10; making these items the most popular downloads from the web page.

### **Education Management**

I was responsible for teaching scheduling at the department for three years, and I have recently given two seminars for the staff at NHH where I explained my teaching methods. A positive outcome from these seminars is the course BED 4 “Bedriftsøkonomiske beslutninger” which now uses an active learning format inspired from my course MET 2 in statistics.

I have been attending two committees for education management.

- [NRØA’s committee for mathematics/statistics \(2010-2016\)](#)

The main responsibility of this committee was to specify learning outcomes for several standard mathematics and statistics courses. The committee collected exam sets from Norwegian Colleges, revealing huge differences in grading practices.

- [External program representative for the MAEC program at University of Oslo \(2017-\)](#)

My main responsibility in this committee is to evaluate teaching, learning outcomes and assessment forms. In particular, I have suggested that they implement more active learning formats. Runar Ile at BI in Oslo is serving in the same committee. He was inspired from my information about collaborative learning, and has implemented a similar construction in his own course.

### **Evidence of Student Learning**

Even though student evaluations and awards are rather imprecise measures of student learning, they give some indication of a job well done.

Here are some results from the student evaluations the last few years. 5.0 is the best possible score on this scale. To put the scores into perspective an evaluation above 4.0 (in a mandatory course) indicates that the lecturer could be eligible for a raise in salary.

Evaluation of lecturer Jan Ubøe (MET 2, spring semester)

- 2016: 4.52
- 2017: 4.74
- 2018: 4.65
- 2019: 4.80 (all time high in this course)

See the appendix A11 for a complete list of verbal statements from the student evaluation in 2019. From time to time, I also teach voluntary courses, and scores in these courses have always been in the range 4.6-5.0. I once obtained a perfect score of 5.0 in a course with only a few students, but it was great fun anyway.

A formal documentation on how my colleagues value my teaching is:

<http://paraplyen.prototype.no/paraplyen/arkiv/2010/august/blank/>

In the spring semesters, I spend about 90 hours participating in collaborative groups. During these groups, I spend quite some time speaking to my TAs. They tell me that they find collaborative learning much more interesting than traditional group sessions. I have included some formal documentation of this in appendix A12: NHH asked for feedback from the TAs regarding teaching in groups. Collaborative learning in my course was mentioned multiple times, courtesy of Frank Mortensen.

In my biography, I already mentioned the **five teaching awards** I have received.

### Dissemination

I have written some 30-40 newspaper chronicles on management, teaching, and popular science. Here are links to a selected few:

<https://www.bt.no/btmener/kronikk/i/L6g31/pisa-rapporten-er-uten-interesse>

<https://www.bt.no/btmener/kronikk/i/G0oO9/Undervisningen-er-for-darlig>

[https://www.aftenposten.no/mener/i/pnmR/Malstyring-er-gatt-ut-pa-dato\\_-og-det-finnes-bedre-alternativer--Jan-Uboe](https://www.aftenposten.no/mener/i/pnmR/Malstyring-er-gatt-ut-pa-dato_-og-det-finnes-bedre-alternativer--Jan-Uboe)

<https://www.aftenposten.no/mener/debatt/i/py16E/PISA-score-har-liten-betydning-for-produktiviteten--Jan-Uboe>

<https://www.bt.no/btmener/debatt/i/vmOwIV/selv-de-gode-forelesningene-er-for-darlige>

I include some references to talks particularly targeted at teachers:

Kvalitetsleing versus målstyring i skulen (Molde 2017)

Hvorfor målstyring ikke virker i skolen (Bergen 2016)

Målstyring – mistillit satt i system (Sarpsborg 2016)

Målstyring – mistillit satt i system (Ulvik 2016)

Målstyring – mistillit satt i system (Arendal 2016)

NHH Samarbeid, tillit og innovasjon (Bergen 2015)



MÅLSTYRING – MISTILLIT  
SATT I SYSTEM

Jan Ubøe, professor i matematikk ved NHH



Harmen De Hoop  
 "Permanent Education"

NUART  
 Vimeo - 8. sep. 2015

I have also made some videos. I mention in particular the video I made in collaboration with the Dutch artist Harmen De Hoop, see <https://vimeo.com/138657980>. This video was part of the street art festival in Stavanger 2015, where I gave a popular lecture on the mathematics behind the financial crisis in 2008. It was great fun making this lecture, and the news even reached Huffington Post

[https://www.huffpost.com/entry/nuart-festival-2015-photos\\_b\\_8125512](https://www.huffpost.com/entry/nuart-festival-2015-photos_b_8125512)



My lecture displayed as street art NUART festival 2015

Appendix

## Kurskritikk-skjema for matematikk, mekanikk og statistikk

58 stb

**NB: det er to sider med spørsmål.**

Kurs: Ma 001 Semester: Vår 1990  
 Hvor mange Mat.Nat. vektall har du fra før? 0. (ca 1/4 har 5-10 vektall)  
 Har du tenkt å ta hovedfag? 

30	12	14
Ja	Vet ikke	Nei

  
 Hvis ja, hvilket fagområde? 19 biologi, 6 kjemi/biologi, 5 informasjon ++

### Læreboken

Hva synes du om læreboken? 

1	3	19	17	16
God		Middels		Dårlig

  
 Er det noe spesielt som er godt eller dårlig med den? Hva? Den er uoversiktlig og har dårlige forklaringer. Boken faller fra hverandre: arkene løsner fra ryggen. Men, den er på norsk, og det er bra.

### Forelesningene

Navn på foreleser: Jan Ubøe  
 Hvor ofte er du på forelesningene? 

42	7	4	1	4
Nesten alltid				Nesten aldri

  
 Hvor godt forbredt er du? 

9	9	31	6	3
Godt		Middels		Dårlig

  
 Var det noe foreleseren brukte for mye eller for lite tid på? Hva? Svært god kritikk av foreleser.

Bør foreleser ha flere eksempler eller mere teori? 

2	4	47	1	1
Flere eksempler		O.K. som det er		Mere teori

  
 Totalt sett, hvordan er forelesningene? 

48	7			
Bra		Middels		Dårlige

### Gruppeundervisningen

Gruppe nummer: \_\_\_\_\_ Navn på gruppelærer: Jan Ubøe

# Kurskritikk-skjema

for matematikk, mekanikk og statistikk

**NB: det er to sider med spørsmål.**

Kurs: MA 001 Semester: V-90

Hvor mange Mat.Nat. vekttall har du fra før? 12

Har du tenkt å ta hovedfag?  Ja  Vet ikke  Nei

Hvis ja, hvilket fagområde? Informatikk

## Læreboken

Hva synes du om læreboken?  God  Middels  Dårlig

Er det noe spesielt som er godt eller dårlig med den? Hva? \_\_\_\_\_

Den er for kompakt, lite forklaringer og har kommentarer av typen, da er det enkelt, dette er lett osv. (Markert det ikke er!)

## Forelesningene

Navn på foreleser: Jan Ubøe

Hvor ofte er du på forelesningene?  Nesten alltid    Nesten aldri

Hvor godt forbredt er du?  Godt  Middels  Dårlig

Var det noe foreleseren brukte for mye eller for lite tid på? Hva? \_\_\_\_\_

En glimrende pedagog!! Utmerket!!

Bør foreleser ha flere eksempler eller mere teori?  Flere eksempler  O.K. som det er  Mere teori

Totalt sett, hvordan er forelesningene?  Bra  Middels  Dårlige

## Gruppeundervisningen

Gruppe nummer: \_\_\_\_\_ Navn på gruppelærer: \_\_\_\_\_

# Kurskritikk-skjema

for matematikk, mekanikk og statistikk

NB: det er to sider med spørsmål.

Kurs: MA001 Semester: VÅR 90

Hvor mange Mat.Nat. vekttall har du fra før? 0

Har du tenkt å ta hovedfag?  Ja  Vet ikke  Nei men, ikke i matte

Hvis ja, hvilket fagområde? Biologi

## Læreboken

Hva synes du om læreboken?  God  Middels  Dårlig

Er det noe spesielt som er godt eller dårlig med den? Hva? Den forutsetter at leseren kan si mye at det blir utallstendige forklaringer/eksempler. Den er ikke god nok pedagogisk.  
Den datter fra hverandre/arkene løsner i ryggen.

## Forelesningene

Navn på foreleser: Jan Uboe

Hvor ofte er du på forelesningene?  Nesten alltid     Nesten aldri

Hvor godt forbredt er du?  Godt  Middels  Dårlig varierende

Var det noe foreleseren brukte for mye eller for lite tid på? Hva? Nei.

Svært bra forelesninger. En pedagogisk begjæring!  
Så bra at en krabbet til forelesningene med 40° i feber.

Bør foreleser ha flere eksempler eller mere teori?  Flere eksempler  O.K. som det er  Mere teori

Totalt sett, hvordan er forelesningene?  Bra  Middels  Dårlige

## Gruppeundervisningen

Gruppe nummer: \_\_\_\_\_ Navn på gruppelærer: \_\_\_\_\_

ingen grupper dette semester.

## Eksamen Ma 364.

Uformell skisse :

Første 15 min : Foredrag om et av følgende emner

- |   |   |   |
|---|---|---|
| <ul style="list-style-type: none"><li>① Kap. 2</li><li>② Kap 3</li><li>③ Kap 6 til og med VI.4</li><li>④ Kap 6 VI.5 og ut</li><li>⑤ Kap 7</li></ul> | } | Alle emner skal være forberedt. Innen hvert emne kan du snakke om det du har lyst til.*<br>Gjerne egne eksempler. |
|---|---|---|

Neste 15 min : Skisse for bevis av en eller to

sentrale setninger i pensum. Hovedformålet er å kunne peke ut de sentrale vanskelighetene, ikke å pugge karakterløse detaljer.

Siste 15 min : Forskjellige detaljer, observasjoner og tekniske håndgrep.

\* Foredraget skal i grove trekk dekke hele emnet, ikke bare bite av

Shortly after my failed approach with teaching the engineering students in 1990, I started using active teaching in mini-groups. I organized my students into four classes with six mini-groups, each with four members. I had a 2-hour plenary session for the four classes on Mondays, and ran one class of collaborative learning every other day in the week. In addition, the students had one additional 2-hour session where TAs went through exercises from the book using a traditional approach. The students hence had 6 hours of teaching each week.

The classes with collaborative learning started with me writing a few exercises on the blackboard, and I continued to supply the blackboard with new problems. As the students struggled a lot even with simple exercises, I quickly understood that the gains from my lectures were depressingly low. In the first year, I had to improvise a lot. I needed to find sufficiently simple problems to progress. The process was very interesting and provided me with instant and valuable information. During my groups on Tuesdays, I could see immediately what worked from my lectures on Mondays, and more importantly, what did not work.

As in a laboratory experiment, I could change my approach on Mondays and observe the effect on Tuesdays. In general, my teaching often improved during the week. That posed a moral dilemma, but I tried not to change my approach too much over the week. As the effect of my lectures seemed very low, I sometimes let the students work on material I had not been through during lectures. In general, this did not work equally well, and I concluded that there were some positive gains from lectures after all. Even though the students were unable to make active use of the material, the lectures seemed to put them in a pre-condition for learning. When this pre-condition was in place, we could progress more quickly with exercises.



[Professor Jan Ubøe fra Norges Handelshøyskole om målinger](#)

Kommunal Rapport

YouTube - 22. jun. 2016

<https://www.youtube.com/watch?v=VY-sal8DzBs>

A7 Fully framed constructive alignment in the course NAB2010 (2011-2019)

## **Organisering av obligatoriske innleveringer i NAB2010 Anvendt Matematikk for nautikk**

Oppgavene til del 2,3 og 5 er obligatoriske, det vil si at de må leveres inn for godkjenning. Innlevering skal skje:

1 mars: Oppgavene til del 2

15 mars: Oppgavene til del 3

26 april: Oppgavene til del 5

Det er lov å samarbeide, og skrive av enkelte mindre elementer, men det er ikke lov å stikke hodet i sanden og skrive av fullstendige løsninger uten at svarene går via hjernen. I utgangspunktet vil alle anstendige forsøk bli godkjent selv om de inneholder mye feil. I verste fall vil en få anledning til å prøve igjen.

Legg merke til at oppgavene til eksamen kommer til å se ut som de oppgavene dere leverer inn for godkjenning.

## **Organisering av eksamen**

Jeg liker å spille med åpne kort, og har ingen problemer med det så lenge vi holder et anstendig faglig nivå. Eksamen blir bygd omkring de tre obligatoriske innleveringene.

- Oppgave 1 blir lik oppgaven på første obligatoriske innlevering, det vil si en båt som kjører i en kanal, og hvor du må løse en 1.ordens differensiallikning for å finne posisjonen ved tid  $t$ .
- Oppgave 2 blir lik oppgaven på andre obligatoriske innlevering, det vil si en båt som kjører på et kart, og hvor du må løse et koplet system av differensiallikninger for å finne posisjonen ved tid  $t$ .
- Oppgave 3 blir lik oppgaven på tredje obligatoriske innlevering, det vil si en båt som kjører på en storsirkel mellom to oppgitte posisjoner, og hvor du må parametrisere kurven for å finne posisjonen ved tid  $t$ .

Utregningen i oppgave 3 blir som regel ganske tidkrevende, og det er mulig jeg vil droppe å spørre om enkelte deler av utregningen slik at oppgaven ikke tar for lang tid. Oppgave 1 og 2 kan gjøres mer eller mindre vanskelig ved å velge enkle eller litt mer kompliserte funksjoner, og omfanget på oppgave 3 vil derfor avgjøres av hvilke valg som blir gjort i oppgave 1 og 2.

A8 About my textbook in statistics (2017)

Vit No. 1: A story about my textbook in statistics



# Professor fikk uventet boksuksess

Statistikk for økonomifaget ble skrevet på bestilling fra forlaget, som ønsket seg en lærebok i statistikk for økonomistudentene. 12 år senere er boken fortsatt en bestselger, og nå i femte utgave.

THEI BIRNA LIFF FOTO HILDEGARD



...og man så at det var like spennende, eller, som i disse årene vil kanskje en professor i matematikk ved sørge om å bli påvirket av sine elever.

...som har skrevet flere lærebøker tidligere, blant annet i matematikk.

...en like spennende boken. Jeg tror ikke dette var noe som ble skrevet for å tjene penger, men for å gi noe til elevene.

...som har skrevet flere lærebøker tidligere, blant annet i matematikk.

...og det var en fantastisk opplevelse.

...som var en ganske hektisk prosess, og det var kanskje noe som gjorde at den ble så god. Det var, vi hadde noen gode lærere som alle de skolefagene hadde, som ikke likte å ta halvparten av tiden sin på å lære noe som de ikke var interessert i.

...som var en ganske hektisk prosess, og det var kanskje noe som gjorde at den ble så god.

...som var en ganske hektisk prosess, og det var kanskje noe som gjorde at den ble så god.

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...som var en ganske hektisk prosess, og det var kanskje noe som gjorde at den ble så god.

A9 Organization of parts of my web page for MET 2: Multiple choice tests and 5-minute summaries of each lecture. (2015-2019)

Oppsummeringer (Video)		
F1: Opsjonsprising	✓	⋮
F2: Grunnbegreper - Utfallsrom og sannsynligheter	✓	⋮
F3: Kombinatorikk	✓	⋮
F4: Betinget sannsynlighet	✓	⋮
F5: Uavhengighet	✓	⋮
F6: Stokastiske variabler	✓	⋮
F7: Simultanfordelinger	✓	⋮
F8: Variansen til en sum av variabler	✓	⋮
F9: Normalfordeling	✓	⋮
F10: Prisen på opsjoner	✓	⋮
F11: Estimering og estimatorer	✓	⋮
F12: Hypotesetesting	✓	⋮
F13: Statistiske tester	✓	⋮
F14: Regresjonsmodellen	✓	⋮
F15: Hypotesetest for regresjonskoeffisienten	✓	⋮
F16: Avsluttende om regresjon	✓	⋮

Forelesning 1	10 poeng   10 spørsmål	✓	⋮
Forelesning 2	10 poeng   10 spørsmål	✓	⋮
Forelesning 3	10 poeng   10 spørsmål	✓	⋮
Forelesning 4	7 poeng   7 spørsmål	✓	⋮
Forelesning 5	10 poeng   10 spørsmål	✓	⋮
Forelesning 6	10 poeng   10 spørsmål	✓	⋮
Forelesning 7	10 poeng   10 spørsmål	✓	⋮
Forelesning 8	10 poeng   10 spørsmål	✓	⋮
Forelesning 9	10 poeng   10 spørsmål	✓	⋮
Forelesning 10	10 poeng   10 spørsmål	✓	⋮
Forelesning 11	10 poeng   10 spørsmål	✓	⋮
Forelesning 12	10 poeng   10 spørsmål	✓	⋮
Forelesning 13	10 poeng   10 spørsmål	✓	⋮
Forelesning 14	10 poeng   10 spørsmål	✓	⋮
Forelesning 15	10 poeng   10 spørsmål	✓	⋮
Forelesning 16	10 poeng   10 spørsmål	✓	⋮

A10 5-minutes summary videos of my lectures, user data. (2018)

Antall studenter i kurset:				461
#	Row Labels	Visninger totalt	Unike visninger	%
Korte studioinnspillinger:				
1	F1: Opsjonsprising	653	314	68,1 %
2	F2: Grunnbegreper - Utfallsrom og sannsynligheter	475	264	57,3 %
3	F3: Kombinatorikk	450	266	57,7 %
4	F4: Betinget sannsynlighet	419	247	53,6 %
5	F5: Uavhengighet	362	232	50,3 %
6	F6: Stokastiske variabler	456	262	56,8 %
7	F7: Simultanfordelinger	404	234	50,8 %
8	F8: Variansen til en sum av variabler	352	220	47,7 %
9	F9: Normalfordeling	365	221	47,9 %
10	F10: Prisen på opsjoner	298	197	42,7 %
11	F11: Estimering og estimatorer	405	234	50,8 %
12	F12: Hypotesetesting	382	227	49,2 %
13	F13: Statistiske tester	312	205	44,5 %
14	F14: Regresjonsmodellen	317	213	46,2 %
15	F15: Hypotesetest for regresjonskoeffisienten	268	193	41,9 %
16	F16: Avsluttende om regresjon	243	177	38,4 %

A11 Student evaluation of MET 2, 2019 (I have included all the verbal remarks from this year)

## What worked best in the course?

Comments
Group sessions
forelesning
Ubøe
Synes gruppeundervisningen fungerte mye bedre enn i MET1. I MET1 stresset studentassistenten seg gjennom fasiten, mens her fikk vi gjøre oppgavene i ro og fred i en gruppe. Hvor vi fikk hjelp dersom det var nødvendig.
Gruppeoppgavene
Gruppeøvingene var supre!
Ubøe er engasjert. Gode gruppetimer. Fint med selvstudiumsoppgaver og repetisjonsvideoer.
gruppeøvinger, gjøre selvstudiumoppgaver med andre studenter, småvideoene
Likte veldig godt hvordan gruppeundervisning var lagt opp med at man fikk oppgavene der og ikke på forhånd. Synes også utvalget av oppgaver vi har tilgang på er bra.
Gruppetimene
– Ubøe er dyktig på å forklare pensumet i forelesningene og når en stiller spørsmål – Heftene med gruppeoppgavene hadde en generell forklaring av relevant fagstoff før hver oppgave. Dette likte jeg veldig godt, for da har man muligheten til å tenke seg frem til løsningen og bygge forståelse selv.
grupper
Foreleser og gruppeundervisning fungerer godt. Ubøe gjør statistikk mykje kjekkare å lære seg enn det eg hadde forventa.
likte at vi fikk et stort oppgavesett i begynnelsen av semesteret slik at jeg visste hva jeg skulle jobbe med iløpet av kurset.
Gruppeundervisningen har fungert svært godt.
Veldig fornøyd med gruppeundervisningen, lærte mye her.
Gruppeundervisningen
Oppsummering av forelesningene på video og selvstudium oppgaver med filmet løsningsforslag ble satt stor pris på! :)
Synest det var bra at vi gjorde oppgaver hver uke som fulgte undervisningen.
Dialoggrupper og oppsummeringsvideoer
The lectures and the weekly group tasks
Forelesninger og grupper fungerte godt
Jan ubøe
God lærebok, god foreleser og gode gruppeøvinger. Også mer frihet til å disponere tiden vår. Krevde ikke for mye for å få kursgodkjenning.
Jan Ubøe sin formidlingsevne av faget. Gruppeundervisningen.
Gruppeundervisningen fikk jeg stort utbytte av. Sette seg ned i grupper for å regne oppgaver sammen fungerte godt.
Gruppeøvinger og forelesninger fungerte meget bra
Gruppeoppgavene.
Gruppeøvingene
De korte videoene som oppsummerer hver forelesning er gode (så dem før den aktuelle forelesningen, gjorde det mye lettere å henge med).
Forelesningene
Forelesningene var bra konstruert. Det var akkurat nok informasjon som ble forelest uten av vi ble overloaded. Boken var lett og oversiktlig å bruke. De anbefalte oppgavene i boken, ga en god trening og innføring i temaet, som ble presentert, og oppgavene vi løste i gruppeøvingene var en veldig god trening på å sikre seg om vi har forstått det viktigste. Gruppeøvingene var veldig bra, studentene bidro aktivt, løste oppgaver selv og tenkte selv. Istedenfor å få det presentert, og å sitte passivt å følge med.
Utrolig flink foreleser. Hver forelesning er en fryd å befinne seg i.
forelesninger
Ubøe
– gruppeøvingene
Fin struktur med undervisning, gruppeoppgaver og selvstudiumoppgaver.
gruppetimer og selvstudium oppgaver
Gruppetimene

## **Innspill fra studentassistentene om undervisningen**

*Jeg synes selv, og hørt fra en del andre studenter, at «**dialoggruppetimer**» fungerer bra. Altså timer der **man jobber i grupper med oppgaver og får hjelp underveis**. Det vil jo selvfølgelig variere fra fag til fag og fra student til student hva som fungerer best, men synes dette har fungert veldig bra i for eksempel MET2 og BED4. Ellers så synes jeg gruppeundervisningsopplegget er veldig bra og fungerer godt som et tilskudd til forelesninger.*

*Som et godt eksempel så ønsker jeg å trekke frem Jan Ubøe i MET2, særlig gruppeundervisning som her er basert på veiledning var veldig verdifull for min del. Erfaringen min er at få studenter har gjort oppgavene på forhånd av gruppeundervisning og **et opplegg som Ubøes gir da bedre læring enn kun å gå igjennom oppgavene på tavlen**. Vil samtidig understreke at selv om jeg tror læringsutbytte er bedre i veiledningsbaserte timer er fremdeles utbyttet stort i de "tradisjonelle" timene.*

*Dette er jeg enig i! Folk jobber ulikt og i ulike tempo med fagene, og med en såpass lav terske som det er i MET2 tror jeg gjør at folk møter opp; fordi de faktisk føler de lærer noe av det.*

*I mange andre gruppetimer er det i høyre grad nødvendig med en del forkunnskaper for å få like mye ut av det.*

*Jeg synes at **gruppesesjoner** à la BED4 og MET2 har fungert svært bra. Jeg tror det ligger i at man ikke må ha forberedt seg på forhånd for å delta, og at man jobber selvstendig med mulighet for hjelp om det trengs. Dette gjør det mulig for alle studentene (både de som er à jour og de som ikke er det) å komme og lære noe.*

*Etter å ha vært stud.ass merker jeg stor forskjell på hvor engasjerte studentene er i **dialogtimer** kontra oppgavegjennomgang på tavlen. Jeg ville, fra både et student- og stud.ass.perspektiv, anbefale flere fag å innføre dialogoppgaver, slik man har i bed4 og met2, heller enn den mer tradisjonelle oppgavegjennomgangen i gruppetimer.*

*Det har kommet mange gode tilbakemeldinger fra de andre studentassistentene som jeg er enig i. Det gjelder spesielt **dialoggruppetimene**, en undervisningsform som jeg selv har lært mye av og ser studentene i MET2 nå setter pris på. Et problem ved denne undervisningsformen jeg opplevde i fjor var lite oppmøte, noe som er betydelig mye bedre i år med obligatorisk oppmøte.*

*Et moment jeg føler gjelder for mange fag er at det ikke er nok runder med **gruppeøvinger**. Gruppeøvinger, både i form av dialoggruppe og vanlig oppgavegjennomgang, er noe av det jeg lærer mest av og jeg setter derfor pris på flere runder i løpet av semesteret.*

*Enig med mye av det som er skrevet her! Vil spesielt trekke fram Ubøes **gruppetimer** jeg også. Disse ga meg personlig et mye større læringsutbytte enn tradisjonell tavleundervisning. En ulempe med "vanlig" gruppeundervisning er at mange av elevene ikke har gjort eller prøvd å gjøre oppgavene på forhånd, slik at studentene ender opp med å kun sitte og febrilsk notere for å få med seg alt, uten og egentlig skjønne hvorfor en gjør som en gjør. Det er ofte vanskelig å gjøre oppgavene på forhånd, nettopp fordi en kanskje ikke har gjennomgått pensum godt nok. Derfor vil en slik mulighet til å jobbe med oppgaver med veileder til stedet være veldig nyttig!*

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