

Syllabus for the Third-Cycle Programme in Mathematics

Introduction

Rules and procedures applicable to third-cycle education are described in a number of governing documents that have been adopted by various bodies.

Governing Document	Adopted by
Higher Education Act (HEA)	The Riksdag
Higher Education Ordinance (HEO) and transitional provisions (Swedish statute 2006:1053)	The Government
Admission regulations for third-cycle studies	University Board 2015-04-24
Rules and regulations for third-cycle studies at the University of Gothenburg	Vice Chancellor 2015-04-13; Faculty Board 2014-01-22, Vice Chancellor 2022-09-16; Faculty Board 2023-01-23.
Syllabus	Faculty Board 2015-03-26; Faculty Board 2022-12-15.
Individual Study Plan (pdf)	Head of Department

This syllabus, which was adopted by the Faculty Board, falls within the framework of current regulations. To provide an overall view, the Faculty Board's rules—the syllabus itself—are provided in the column on the right, while the regulations appear in the column on the left.

Parent regulations	Faculty Board's supplementary rules
1. Goal	
Third-cycle courses and study programmes shall be based fundamentally on the knowledge acquired by students in first and second-cycle courses and study programmes, or its equivalent. In addition to the requirements for first and second-cycle courses and study programmes, third-cycle courses and study programmes shall develop the knowledge and skills required to be able to undertake autonomous research. (Higher Education Act 1:9a).	Education at the third-cycle level shall prepare the student for continued activities both within and outside academia.

<p><u>1.1 Knowledge and understanding</u> For the Degree of Doctor the third-cycle student shall:</p> <ul style="list-style-type: none"> - demonstrate broad knowledge and systematic understanding of the research field as well as advanced and up-to-date specialised knowledge in a limited area of this field, and - demonstrate familiarity with research methodology in general and the methods of the specific field of research in particular. 	
<p><u>1.2 Competence and skills</u> For the Degree of Doctor the third-cycle student shall</p> <ul style="list-style-type: none"> - demonstrate the capacity for scholarly analysis and synthesis as well as to review and assess new and complex phenomena, issues and situations autonomously and critically - demonstrate the ability to identify and formulate issues with scholarly precision critically, autonomously and creatively, and to plan and use appropriate methods to undertake research and other qualified tasks within predetermined time frames and to review and evaluate such work - demonstrate through a dissertation the ability to make a significant contribution to the formation of knowledge through his or her own research - demonstrate the ability in both national and international contexts to present and discuss research and research findings authoritatively in speech and writing and in dialogue with the academic community and society in general - demonstrate the ability to identify the need for further knowledge and - demonstrate the capacity to contribute to social development and support the learning of others both through research and education and in some other qualified professional capacity. <p><u>1.3 Judgement and approach</u> For the Degree of Doctor the third-cycle student shall:</p> <ul style="list-style-type: none"> - demonstrate intellectual autonomy and disciplinary rectitude as well as the ability to make assessments of research ethics, and - demonstrate specialised insight into the possibilities and limitations of research, its role in society and the responsibility of the individual for how it is used. (Higher Education Ordinance, Qualifications Ordinance) 	
<p>Parent regulations</p>	<p>Faculty Board's supplementary rules</p>

2. Eligibility	
<p>2.1 General entry requirements A person meets the general entry requirements for third-cycle courses and study programmes if he or she (i) has been awarded a second-cycle qualification, (ii) has satisfied the requirements for courses comprising at least 240 credits of which at least 60 credits were awarded in the second-cycle, or (iii) has acquired substantially equivalent knowledge in some other way in Sweden or abroad.</p> <p>The dean concerned may permit an exemption from the general entry requirements for an individual applicant if there are special grounds. (Higher Education Ordinance 7:39; Admission Regulations § 3.1)</p>	<p>The decision on exemptions from the general entry requirements is delegated to the Head of the Department of Mathematics.</p>
<p>2.2 Specific entry requirements The specific entry requirements laid down shall be essential for students to be able to benefit from the course or study programme. These requirements may comprise (i) knowledge from one or more higher education courses and study programmes or corresponding courses and study programmes, (ii) specific professional or vocational experience, and (iii) requisite language skills or other conditions determined by the course or study programme. (Higher Education Ordinance 7:40)</p> <p>The requirements in the specific entry requirements are to be indicated by the general syllabus of the third-cycle subject in question (Admission Regulations § 3.2)</p>	<p>To meet the specific entry requirements for third-cycle studies, applicants must: (i) have a second-cycle (advanced-level) degree in the subject area mathematics, or (ii) have completed studies for at least 60 higher education credits at a second-cycle level in mathematics, or (iii) have completed a corresponding programme of relevance to the planned third-cycle programme, in Sweden or in another country, or have equivalent qualifications.</p> <p>The specific entry requirements also include an acceptable command of spoken and written English. Guidelines for assessing English proficiency may include a minimum score of 550 on the TOEFL test (or 213 on the TOEFL-CBT, or 79 on the TOEFL-iBT).</p>
Parent regulations	Faculty Board's supplementary rules
3. Selection	

<p>In selecting between applicants who meet the requirements laid down in Sections 35 & 36 their ability to benefit from the course of study programmes shall be taken into account.</p> <p>The higher education institution determines which assessment criteria shall be used in determining the ability to benefit from the courses and study programmes.</p> <p>However, the fact that an applicant is considered able to transfer credits from prior courses and study programmes or for professional or vocational experience may not alone give the applicant priority over other applicants. (Higher Education Ordinance 7:41)</p> <p>Selection to third-cycle studies shall be based on the general and specific entry requirements laid down in the general study syllabus and on assessments of the applicants' overall ability to benefit from the studies. (Rules and Regulations 5.2)</p>	<p>The following selection criteria will be applied:</p> <ul style="list-style-type: none"> - credentials for a first-cycle programme - credentials for a second-cycle programme, as set out in the specific entry requirements - relevance of prior education to the planned third-cycle programme - assessment of the applicant's ability to benefit from third-level education - where applicable, assessment of the applicant's ability to work in a research group <p>The applicant may supplement the application documents with interviews and references. Selection may not be done in a way that specifically benefits applicants who have previously worked on projects or have had project employment at the supervisor's department.</p>
<p>The selection of applicants for third-cycle studies is to be prepared in such a way that enables participation by a representative appointed by the students. (Admission Regulations § 3.4)</p>	
<p>Parent regulations</p>	<p>Faculty Board's supplementary rules</p>
<p>4. Admission</p>	

<p>Calls for applications for third-cycle studies are to facilitate competition among applicants. Calls are to be made in ways and via channels that are conducive to the University's aim of increasing its rate of international recruitments. Consequently, calls must be published in both Swedish and English. The time periods between an announcement of a call for applications and the application deadline must be at least three weeks. (Rules and Regulations 4.1).</p> <p>The rules concerning calls for applications for third-cycle studies may be disregarded in the following cases:</p> <ul style="list-style-type: none"> - admission of a third-cycle student finances within a framework where the University of Gothenburg does not serve as employer (external positions, so-called <i>samverkansdoktorand</i>), - admission of a third-cycle student financed via stipends according to Section 6 below, and - when a third-cycle student changes higher education institution or subject area. (Rules and Regulations 4.4) <p>Calls for applications for third-cycle studies are to include information about:</p> <ul style="list-style-type: none"> - the subject area in question, - financing of the announced position(s), - the assessment criteria used to assess applicants' ability to benefit from the studies, and - the degree that the announced position(s) will lead to upon completion of the studies. (Rules and Regulations 4.2) <p>A call for applications for third-cycle studies may not include any entry requirements that are not stated in the Higher Education Act, the Higher Education Ordinance and the applicable general study syllabus. (Rules and Regulations 4.3)</p> <p>The Vice-Chancellor has delegated all admission decisions and management duties with respect to third-cycle studies to the respective Heads of Department. (Rules and Regulations 2.4)</p>	<p>Advertisements must be published on the university website under "Job Opportunities" in both Swedish and English. The advertisement shall also be forwarded to relevant departments at other Swedish institutions of higher education. Advertising in daily newspapers or the trade press is recommended. The minimum application period is three weeks.</p> <p>Admission decisions are delegated to the Head of the Department of Mathematics, and may not be delegated to anyone else.</p>
<p>Third-cycle admission decisions are made by the Head of Department. Admission decisions must be registered promptly in the University's computer-based documentation system Ladok, and all applicants must be notified of the decision within three weeks. Admission decisions are final and cannot be appealed. (Rules and Regulations 5.9)</p>	

<p>Notification of admission is to be in writing and must include:</p> <ul style="list-style-type: none"> - the student's name and personal identity number, - an account of the general and specific entry requirements taken into consideration, - a funding plan for the entire period of study, and - information concerning the type of degree the student has chosen to pursue. (Rules and Regulations 5.8) 	
<p>A person may be appointed to a doctoral studentship for a total of eight years. The total employment period may, however, not exceed the time corresponding to full-time third-cycle study for four years. For courses or study programmes to be concluded with the award of a licentiate degree or a licentiate degree in the fine, applied and performing arts the total employment period may not exceed the time corresponding to full-time third-cycle study for two years. The time spent studying by the third-cycle student while not appointed to a doctoral studentship shall be deducted from these periods. (Higher Education Ordinance 5:7)</p>	
<p>Third-cycle students admitted to a doctoral programme that lead to a doctoral degree, have the right to conclude their studies with a licentiate degree. (Rules and Regulations 5.6)</p> <p>In cases when a student is admitted to licentiate studies, the Head of Department is responsible to inform the student, in writing, that in order for him or her to pursue a doctoral degree, a new admission procedure will be required. This written information is to be enclosed with the student's individual study plan. When a person with a licentiate degree applies to doctoral studies, he or she may not be favoured in relation to other applicants due only to the fact that he/she may be able to apply his/her licentiate studies towards a doctoral degree. (Rules and Regulations 5.7)</p>	<p>Admission, where the ultimate aim is a licentiate degree, shall be based on the applicant's own choice.</p>

<p>The doctoral student is entitled to supervision during his or her studies unless the vice-chancellor has decided otherwise by virtue of Section 30. (Higher Education Ordinance 6:28)</p> <p>At least two supervisors are to be appointed by the Head of Department within one month of the admission decision. The supervisor(s) shall be identified in the individual study plan. One of them is to be appointed principal supervisor and the other(s) assistant supervisor(s). (Rules and Regulations 10.2)</p> <p>When the supervisors are appointed, one of the supervisors must be at least at the level of a Reader (docent). Supervisors may be recruited from other higher education institutions or outside the academic community. The supervisors are to be affiliated with the University by employment or commission. (Rules and Regulations 10.5)</p> <p>At least one of the supervisors must have completed the University's training in supervision of third-cycle students or an equivalent programme at another higher education institution. (Rules and Regulations 10.4)</p>	<p>One of the supervisors must be at least at the level of Reader (Docent) and a permanently employed teacher at the Faculty of Science or interacting department.</p> <p>Students at the Faculty of Science are entitled to supervision corresponding to at least 340 hours in total during the period of study. The supervision includes study plans, meetings as well as preparatory and supplementary work for supervision meetings by the principal and assistant supervisor. Supervisors and students shall have regular and planned meetings.</p>
<p>Examinations that form part of third-cycle courses and study programmes shall be assessed in accordance with the grading system prescribed by the higher education institution. The grade shall be determined by a teacher specially nominated by the higher education institution (the examiner). (Higher Education Ordinance 6:32)</p> <p>Neither a student's principal supervisor or assistant supervisor may serve as student examiner. The student's examiner must be identified in the individual study plan. (Rules and Regulations 7.2)</p>	<p>The Head of the Department appoints a student examiner for each doctoral student in conjunction with admission.</p>

Parent regulations	Faculty Board's supplementary rules
5. Individual study plan	

<p>An individual study plan shall be drawn up for each doctoral student. This plan shall contain the undertakings made by the doctoral student and the higher education institution and a timetable for the doctoral student's study programme. The plan shall be adopted after consultation with the doctoral student and his or her supervisors. (Higher Education Ordinance 6:29)</p> <p>The individual study plan is to be established according to the University's central template for individual study plans. (Rules and Regulations 8.4)</p>	<p>Each student shall have follow-up and planning discussions with their student examiner at least once a year.</p>
<p>The Heads of Department are also to ensure that individual study plans are established and revised at least once a year. (Rules and Regulations 2.4)</p> <p>The supervisor and the student are to establish and revise the individual study plan in consultation with the student examiner. The student examiner is also to participate in the monitoring of studies. Decisions regarding the individual study plan are to be made by the Head of Department. (Rules and Regulations 7.3)</p> <p>The period of study may only be extended if there are special grounds for doing so. Such grounds may comprise leave of absence because of illness, leave of absence for service in the defence forces or an elected position in a trade union or student organisation, or parental leave. (Higher Education Ordinance 6:29)</p>	

Parent regulations	Faculty Board's supplementary rules
6. Programme content	
<p>Throughout the period of study, the student is expected to repeatedly present his/her thesis work, for example manuscripts and research results, at seminars/ equivalent according to guidelines provided by the Faculty Board. (Rules and Regulations 10.12)</p>	<p>Students at the Faculty of Science shall either present a licentiate thesis or a report that is discussed at an open seminar at the Department midway through their thesis work. A preliminary thesis shall be discussed at a seminar, including a prepared public review, well before the public defence. The Department may decide on more detailed rules.</p>

A Degree of Licentiate is awarded *either* after a third-cycle student has completed a study programme of at least 120 credits in a subject in which third-cycle teaching is offered, *or* after a third-cycle student has completed one part comprising at least 120 credits of a study programme intended to conclude with the award of a PhD, if a higher education institution decides that a Degree of Licentiate of this kind may be awarded at the institution.

For a Degree of Licentiate the third-cycle student shall have been awarded a pass grade for a research thesis of at least 60 credits. (Higher Education Ordinance, Degree Ordinance)

The degree of Licentiate requires a passing grade in the licentiate seminar as well as courses worth between 30 and 45 credits, including the Faculty's Introductory course for third-cycle students and the department's compulsory courses, see below. The scope of the course part should be decided in conjunction with the selection of each individual student.

<p>A Degree of Doctor is awarded after the third-cycle student has completed a study programme of 240 credits in a subject in which third-cycle teaching is offered. For the Degree of Doctor the third-cycle student shall have been awarded a pass grade for a research thesis (doctoral thesis) of at least 120 credits. (Higher Education Ordinance, Degree Ordinance)</p>	<p>One of the requirements for a degree of Doctor is a passing grade on a doctoral dissertation defended orally at a public defence, as well as courses worth between 60 and 90 credits, including the Faculty's Introductory course for third-cycle students and the department's compulsory courses. The scope of the course part should be decided in conjunction with the selection of each individual student.</p> <p>At least 60 credits must be Ph.D. courses or joint MSc/PhD level courses and the choice of the courses should be discussed with main supervisor, examiner and tailored to individual needs of the Ph.D. student. Participation in seminar activities can give up to 7.5 credits.</p> <p>For the doctoral degree in Mathematics (without specialization), 30 of the required credits must consist of four courses (at least 7.5 credits each), one from each of the areas listed below:</p> <ul style="list-style-type: none">• Mathematical analysis• Algebra• Topology and Geometry• Applied mathematics <p>All four courses should typically be completed before the licentiate degree.</p> <p>For the doctoral degree in Mathematics with specialization in Applied Mathematics, 22.5 of the required credits must consist of three courses, one from each of the main topics in the list below:</p> <ul style="list-style-type: none">• Computational mathematics• Mathematical Statistics/Data science• Optimization <p>For the licentiate degree, two of these courses (15 credits) should be completed.</p>
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<p>Third-cycle students who teach at the first- or second-cycle level must have completed the course Teaching and Learning in Higher Education 1; Basic course, 5 higher education credits. Students with other pedagogical training may have their qualifications assessed according to the procedure outlined in the University's official document <i>Procedure for testing and recognising university teaching qualifications</i>. (Rules and Regulations 12.1)</p> <p>The Faculty Board is to decide whether the training in teaching and learning in higher education shall be completed within the framework of the student's departmental duties or as a credit-yielding activity within his/her study programme. (Rules and Regulations 12.3)</p>	<p>Teaching and Learning in Higher Education 1; Basic course, 5 higher education credits (HPE101) constitutes a compulsory course for third-cycle programmes at the Faculty of Science. The Dean may grant an exemption, following application, to students who will not definitely be teaching during their period of study.</p> <p>The training in teaching and learning in higher education is a credit-yielding activity within the study programme.</p>
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Parent regulations	Faculty Board's supplementary rules
<p>7. Examination</p>	
<p><u>Licentiate seminar</u> The licentiate thesis is to be presented and examined at a public seminar, at which an external reviewer must be presented. The Department to which the subject area is connected is to cover the cost of reproduction of the thesis for the licentiate seminar. (Rules and Regulations 16.3)</p> <p>The Head of Department decides on the date and time of the seminar and appoints reviewer. The licentiate seminar is to be announced at least three weeks in advance, in the manner decided by the Faculty Board. Before an announcement can be made, the thesis must be made available at the Department. (Rules and Regulations 16.4)</p> <p>The licentiate seminar is to take place on a weekday during the periods 1 September to 22 December and 7 January to Friday one week before midsummer. If there are special circumstances, the Head of Department can schedule a seminar at other times of the year. (Rules and Regulations 16.5)</p>	<p>The licentiate seminar shall be held at the University's premises in Gothenburg. The licentiate seminar may also be held at the University's premises at Fiskebäckskil, Mariestad and Strömstad where relevant to the subject.</p> <p>The student examiner shall send the Head of Department a proposal in respect of time, venue and reviewer for the licentiate thesis no later than five weeks before the seminar. The reviewer of the licentiate thesis may not work at the Faculty of Science. The reviewer and the research team for the author of the thesis may only have co-published works in exceptional cases. Such co-publishing must be old enough for there to be no suspicion of a conflict of interest. The times for the announcement of a thesis shall be the same as for when the licentiate seminar may be implemented. A Head of Department may permit a shortening of the announcement period if there are exceptional reasons.</p> <p>Sufficient copies of the licentiate thesis shall be prepared to enable a satisfactory review of the thesis to be conducted at the</p>
	<p>seminar. One copy will be sent to the Faculty Office.</p> <p>Grading is done by the examiner after completed licentiate seminar. The grades possible are pass (G) or fail (U).</p>

Public defence

The qualification descriptors for PhD's and doctorates in the fine, applied and performing arts lay down that an approved doctoral thesis is required for the award of these degrees.

The doctoral thesis shall be presented and defended orally in public. A faculty examiner (opponent) shall be appointed for this presentation. (Higher Education Ordinance 6:33)

A public defence is to take place on a weekday during the periods 1 September to 22 December and 7 January to Friday one week before midsummer. If there are special circumstances, the defence may be arranged at other times of the year, as decided by the Dean. (Rules and Regulations 17.16)

A doctoral thesis shall be made public on the university notice board in Vasaparken, a weekday no later than three weeks prior to the defence through "nailing". The periods 16 June to 15 August and 24 December to 6 January cannot be counted as "nailing-time". Exemption from the three-week rule may be granted by the dean. Electronic publishing of the thesis must be in accordance with the respective faculty rules. (Rules and Regulations 17.6)

An examining committee comprising three or five members is to assess whether the content and defence of a doctoral thesis meet the quality standards of the scientific or artistic community. The grade assigned shall reflect both the content and defence of the thesis. (Rules and Regulations 17.8)

The examining committee shall consist of at least one person who does not have a post at the University of Gothenburg. Examining committee consisting of five members must include at least two such persons. No more than one member of an examining committee may be from the doctoral student's home Department/ equivalent. Persons who have served as the student's supervisor may not serve on the examining committee for that student. The distribution of examining committee members shall be as gender-equal as possible. The Faculty Board may present specific eligibility requirements for the members of an examining committee. (Rules and Regulations 17.9)

The public defence shall be held at the University's premises in Gothenburg. The public defence may also be held at the University's premises at Fiskebäckskil, Mariestad and Strömstad where relevant to the subject. A public defence within a related subject area may not be implemented during the same day.

No more than one member may be from the Faculty of Science at the University of Gothenburg. A deputy shall also be appointed for the examining committee. No more than one person within the members and deputy's group may come from the author's Department/equivalent. Members of an examining committee must be qualified to at least the level of Reader (Docent) or have equivalent competence. A member of the examining committee and the author's research team may only have been co-published in exceptional cases. Such co-publishing must be old enough for there to be no suspicion of a conflict of interest.

The faculty examiner must be qualified to at least the level of Reader (Docent) or have equivalent competence. The faculty examiner and the author's research team may only have been co-published in exceptional cases. Such co-publishing must be old enough for there to be no suspicion of a conflict of interest.

Sufficient copies of the doctoral thesis shall be prepared to enable a satisfactory review of the thesis to be conducted at the public defence.

Doctoral theses shall use the Faculty front cover.

Parts of the thesis (summarising chapter, notification of submission of the thesis, DOI links to published works (where such links are available) and information about the other works included in the thesis) will also be e-published in Gupea in conjunction with the 'nailing' of the thesis. Exceptions are granted for monographs where the publisher does not permit e-publication, though the notification shall be e-published.

Both genders shall be represented in the examining committee.

<p>A specially appointed faculty examiner (opponent) is to review the doctoral thesis at the public defence. Then the examining committee shall present an assessment and record it in the doctoral defence transcript. The faculty examiner may not have a post at the Faculty where the thesis is presented, unless there are special grounds to the contrary. (Rules and Regulations 17.10)</p> <p>The examining committee is competent to make decisions only when all members are present. (Rules and Regulations 17.11)</p> <p>The grading scale for doctoral theses comprises pass (G) and fail (U). Decisions of the examining committee shall be based on the consensus of most members. An individual member has the right to register a difference of opinion in the official transcript. A grade of U (fail) must be justified in writing. (Rules and Regulations 17.12)</p> <p>In addition to the members of the examining committee, the opponent and the supervisors may be present at the meeting with the examining committee and participate in the discussion, however, the opponent and the supervisors may not participate in the final decision-making. (Rules and Regulations 17.13)</p>	<p>The opponent, examining committee and time and place for the public defence shall be appointed by the Pro-Dean.</p>
<p><u>Grades for doctoral dissertations</u> At least one of those participating in the grading of a doctoral thesis shall be someone who does not have a post at the higher education institution awarding the degree. (Higher Education Ordinance 6:34)</p> <p>A higher education institution may issue regulations on the grading system to be used and on public defences and grading in other respects. (Higher Education Ordinance 6:35)</p>	<p>The examining committee must meet immediately after the public seminar. The committee must appoint one of its members chair of the meeting. The deputy of the examination board have the right to participate in the examination committee's deliberations, but not in its decision. In the minutes it shall be noted if the decision was unanimous or by 2/3.</p>

Parent regulations	Faculty Board's supplementary rules
8. Qualifications	

Title of qualification

The title of a qualification consists of a qualification as specified in this annex preceded or followed, where relevant, by a designation indicating the area of specialisation. Each higher education institution determines which designations shall be used. As the qualification descriptors indicate, for certain qualifications each higher education institution shall determine an area of specialisation. (Higher Education Ordinance, Degree Ordinance)

List of qualifications:

Filosofie doktor i matematik (, inriktning tillämpningar)

Filosofie licentiat i matematik (, inriktning tillämpningar)

Doctor of Philosophy in Mathematics (, specialising in Applied Mathematics)
Licenciate of Philosophy in Mathematics (, specialising in Applied Mathematics)

A doctoral student with advanced level education at a technical university/faculty can get alternative title:

Teknologie doktor i matematik (, inriktning tillämpningar)

Teknologie licentiat i matematik (, inriktning tillämpningar)

Doctor of Philosophy in Mathematics (, specialising in Applied Mathematics)
Licenciate of Philosophy in Mathematics (, specialising in Applied Mathematics)
The title of qualification shall be decided upon admission to third-cycle studies.

Please see a separate document for the specialization in Educational Science.