

PHYS451 MPhys Project (Including PHYS452 Literature Search)

Introduction

The MPhys project provides the opportunity to study a topic in depth that you have chosen or which has been suggested by a member of staff. It starts with the literature search in the Summer Term of the 3rd year, which will provide the background information necessary for you to complete your own investigations during the research phase of the project. The literature search is 0.5 units, while the research and reporting phase of the project is worth 1.5 units. The main learning outcomes are:

- To have reviewed a topic (PHYS452 literature search),
- To have investigated an area of physics in a systematic way using appropriate techniques,
- To have systematically recorded your work,
- To have reported your results and their interpretation in written and oral form.

You are expected to put in about 600 hours of effort into the project, including the literature search. The investigatory part of the project should be undertaken during Weeks 1 to 15, occupying, on average, two to three days per week for the whole period. The amount of time spent on the literature review and your own investigations will vary from project to project, but will be about 1:3. Your supervisor will give you some material to read (over the summer), and also suggest areas in which you should conduct your own literature search using library facilities. You can expect, especially for theoretical projects, that further reading will be needed as your own investigations progress.

A list of MPhys projects can be found on the Department's teaching pages on the Web for guidance on what topics may be available, or you can propose a topic to a member of staff. Either way, contact should be made with one or more members of staff to choose a project at the start of the Summer Term. You will be supplied with a 'voucher' which you should give to your supervisor to complete and return to the Part II Teaching Secretary to formalise your choice of project. **You must select a project topic and supervisor at the latest by the end of Week 27 in your 3rd year (Summer Term).** This is to allow your supervisor to give you some reading material for the summer break.

PHYS452 Literature Search

The literature search is worth 0.5 units, which corresponds to about 150 hours of your time. We shall expect to see clear signs that you have expended that degree of effort. You should see your supervisor as soon as possible after the project has been selected in order to prepare for the literature search, including to help define the scope of your survey and the resulting report, to provide some initial references to get the work started, and ideally, to discuss the range of material you will be reading, from lists you prepare. The gathering of information for the literature search will involve considerable use of library facilities for searches of original material and subject reviews. You should also be using the Web where appropriate to find the latest information. For theoretical projects there may be a significant taught element. Remember that all sources of material should be acknowledged in the report. The work starts in the Summer term of the 3rd year and continues over the summer vacation, ending with the submission and examination of the report in October. For advice on preparing the report, please refer the Department's report writing guidelines, which are available on the Web.

Assessment of PHYS452

Your report will be marked by your supervisor and a second, independent marker, sufficiently knowledgeable in the field. The report itself will be assessed according to the criteria of Presentation (20 marks), Motivation & Purpose (20 marks), Content (25 marks) and Understanding (25 marks).

Your supervisor will also give a mark (10 marks), based on your initiative, *i.e.* **the extent to which you have independently researched and understood the topic using sources other than those (s)he provided.** A table is appended which will be used by your examiners as guidance in awarding marks for the literature report.

Research Work (PHYS451)

The research and reporting phase of your project is worth 3/2 units and runs throughout the 4th year. The main research phase is from Weeks 1 to 15, during which time you should expect to spend 2 to 3 days per week in the laboratory or at your desk. A first draft of the report should be ready by the end of Lent Term in order to give time for revision over Easter.

Log Book

During your project you are required to make regular and detailed entries into a personal log book throughout the period of investigation. The log book can be obtained from the Part II Teaching Secretary. The log book will form a record of your progress on the project and will be a valuable aid to you when writing your final report. Your log book need not be neat and should not be a 'best' version of something written elsewhere, but should be a contemporaneous account of your work. It should be used to record experimental results and conditions (temperature *etc.*), draft calculations and rough working, formulae, computer filenames *etc.*, but also ideas, insight and general observations which put your work into a wider context. All entries should be dated. You are expected to have regular meetings with your supervisor to discuss progress on your project and **your supervisor should regularly write brief comments in your log book (signed and dated).** Your supervisor's comments should indicate if your progress is satisfactory and suggest, where appropriate, ideas for further work. Your log book keeping will be assessed as part of your performance during the project by your supervisors. **Your log book must be submitted with your report at the end of the project. Please ask your supervisor to sign the final page before you submit it.**

Risk assessment and safety

Safety is of overriding importance in your project, and your supervisor is legally bound to undertake all reasonable measures to provide you with a safe environment in which to do your work. This should include briefing you about any safety issues of your project, and helping you to prepare a risk assessment for your project. This should be done using a standard departmental form (available on the Departmental Web pages). When you have completed your risk assessment, your supervisor should check it, including comparing it with a previous risk assessment (if any) and sign it. You should glue a copy into your log book. Your supervisor will give a copy to the Departmental Safety Officer (Shonah Ion), and another copy should be generally available in the laboratory. You should keep your risk assessment in mind, and, if necessary, revise it as the project progresses.

Shadow Supervisor

In addition to your supervisor, you will have a shadow supervisor. His/her task is to regularly check on your progress (including your log book), and to help you in the event that your supervisor is absent.

Use of the literature search in MPhys project reports

Your literature search is a valuable resource to help you prepare your final report. However, it should cover the background to the project in more detail, and/or over a broader range of the topic than the introductory sections in the project report. Maybe your project shifted in emphasis during its

execution a little from what you originally thought. Your examiners will also want to see that your understanding of the background has been advanced by the project! Copying large sections of text from the literature search to the project report will not achieve any of the above and should not be done. Under no circumstances should the results of your project be simply appended on to the literature search.

Assessment of projects

The assessment of the research phase of the project has three elements.

(i) **Independent learning mark (40 marks):** Your supervisor will assign an independent learning mark based on his/her assessment of your motivation/initiative, log-book keeping and overall performance. This mark must be approved by your shadow supervisor.

(ii) **Written report (50 marks):** At the end of the project you have to submit a report, which forms 50% of the assessment for the module. General guidance on report writing for projects and dissertations are given on the departmental Web pages. The report must be submitted in duplicate as a paper copy in the Summer term. An identical copy should be uploaded **ONCE as a SINGLE pdf file** to LUVLE for the purposes of plagiarism detection and for our records. Your report will be marked by your supervisor and by a second examiner, who will not be your shadow supervisor.

(iii) **Oral examination (10 marks):** You are required to attend an oral examination or *viva voce* of your project work. The purpose of your viva is to give you the opportunity to discuss your project work with your examiners, and possibly to clarify any aspects of your work or understanding that are not easily or clearly conveyed in the more formally structured report. Examiners will be primarily concerned with determining what you *do know* about your project. Besides the two examiners, a moderator will also be present. The oral examination will typically be held in Week 27. Note that your talk on your project work in the mini-conference is not part of the project assessment, but is assessed as part of PHYS431 Research Presentation Skills.

All marks will be given on the University scale, and will be independently moderated. A table is appended which will be used by your examiners as guidance in awarding marks for the project report.

Timetable

Week 21, 3rd year	Start to look for a project/supervisor
Week 27, 3rd year	Deadline for selecting project topic and supervisor
Week 1	Investigatory part of project should begin
Week 2 (end)	Deadline for handing in literature search
Week 15 (end)	Investigatory part of project should be completed
Week 22 (start)	Deadline for handing in reports
Week 27	Mini-conference & oral examinations

Late penalty

Late submission of a report will result in a penalty of 10 marks if it is between one and seven days late, unless prior permission has been obtained by the Projects and Dissertations Organiser, with the written approval of the supervisor and shadow supervisor. Any late submission without approval, or longer than a week, will result in a mark of zero. Failure to submit a report could lead to an uncondoned fail, which will exclude the possibility of being awarded an honours degree.

Azzedine Hammiche Prize

A prize will be awarded for the best project (highest mark in module 451), in memory of Azzedine Hammiche (1956 - 2008).

MH/HS 02/08/2011

Assessment Guidelines for PHYS452 Reports

University scale	Presentation (20%)	Motivation and purpose (20%)	Content (25%)	Understanding (25%)
Exceptional (1 st Class)	<ul style="list-style-type: none"> Exceptional and innovative report structure, superbly laid out No spelling, punctuation and grammatical errors Excellent clear and highly readable writing style Near-perfectly presented tables/figures with very clear captions (self-contained) A broad range of relevant references from multiple sources properly included and cited, indicating an excellent knowledge of the field Equations are numbered, perfectly formatted, symbols are clearly defined 	<ul style="list-style-type: none"> An exceptional abstract succinctly describes the report and excites the reader Novel/important motivation for the work is identified The description of the background reveals a complete and deep understanding of the subject The report is highly accessible to a non-expert reader Wider implications of the topic have been described with exceptional clarity Suggested future work/directions in the topic are innovative and exciting 	<ul style="list-style-type: none"> The report is an exceptional summary of the topic All relevant aspects of the topic have been discussed with exceptional clarity The balance between sub-topics is outstanding An impressive range of sources have been used to prepare the report Relevant equations are fully integrated in a way that promotes understanding Innovative figures and diagrams are used to outstanding effect Units have been correctly used and applied throughout There are no errors 	<ul style="list-style-type: none"> The report reveals a remarkable physical intuition An exceptional knowledge of the subject is demonstrated The discussion of the topic is outstanding The conclusions capture the essence of the work and reveal its importance The report contains no misconceptions or misunderstandings The report as a whole shows that the student has an exceptional understanding of the subject
Excellent (1 st Class)	<ul style="list-style-type: none"> Excellent report structure, well laid out and with all relevant sections included Very few spelling, punctuation and grammatical errors Very good writing style Clearly and well presented tables/figures with clear captions (self-contained) A range of relevant references properly included and cited from multiple sources Equations are numbered, well formatted and symbols defined 	<ul style="list-style-type: none"> There is a clear, concise and very well written abstract that briefly describes the report The motivation for doing the work is excellently described All relevant background to the work is clearly and concisely presented The introductory sections are highly accessible to a non-expert reader The wider implications of the topic have been understood and are clearly presented Future work/directions in the topic have been very well considered 	<ul style="list-style-type: none"> The report is an excellent summary of the topic All relevant aspects of the topic have been covered The balance between sub-topics is excellent A range of sources have been used to prepare the report Relevant equations have been included where appropriate Figures and diagrams are used to excellent effect Units have been correctly used and applied with a few exceptions There are 1 or 2 small errors of very minor importance 	<ul style="list-style-type: none"> The report reveals excellent physical intuition An excellent knowledge of the subject is demonstrated The discussion of the topic is excellent The conclusions capture the essence of the work The report contains a very small number of minor misconceptions or misunderstandings The report as a whole shows that the student has an excellent understanding of the subject
Good to very good (Upper 2 nd Class)	<ul style="list-style-type: none"> Good report structure with all relevant sections included A few spelling, punctuation and grammatical errors Good writing style Clear tables/figures with captions Relevant references properly included and cited Equations are numbered and symbols defined 	<ul style="list-style-type: none"> The abstract is generally well written but could be improved The motivation for doing the work is well described Most relevant background to the work is well presented Reading the introductory sections requires a little expert knowledge The wider implications of the topic are generally well presented Future work/directions in the topic have been included, but need further thought 	<ul style="list-style-type: none"> The report is a (very) good summary of the topic Most relevant aspects of the topic have been covered The balance between sub-topics is good to very good A handful sources have been used to prepare the report Relevant equations have mostly been included where appropriate There is (very) good use figures and diagrams in the report Units have been correctly used and applied with several exceptions There are a few errors of minor importance 	<ul style="list-style-type: none"> The report reveals good physical intuition A good knowledge of the subject is demonstrated The discussion of the topic is well thought out The conclusions nicely summarise the work The report contains a number of minor misconceptions or misunderstandings The report as a whole shows that the student has a good understanding of the subject

Satisfactory to good (Lower 2nd Class)	<ul style="list-style-type: none"> • Satisfactory report structure with nearly all relevant sections included • Several spelling, punctuation and grammatical errors • Acceptable writing style • Tables/figures with captions • Most references are relevant, properly included and cited • Some unnumbered equations or undefined symbols 	<ul style="list-style-type: none"> • The abstract is not very clearly written, or has some relevant information missing • The motivation for doing the work is adequately described • Some relevant background is missing or poorly presented • A non-expert would have difficulty with a substantial part of the introductory sections • Some implications of the topic are described • Future work/directions have been vaguely discussed 	<ul style="list-style-type: none"> • The report is a satisfactory summary of the topic • Some relevant aspects are missing • The balance between sub-topics is satisfactory • A few sources have been used to prepare the report • Some equations are missing or are superfluous • Use of figures/diagrams is satisfactory • Units have mostly been correctly used • There are several errors of minor importance 	<ul style="list-style-type: none"> • The report reveals some physical intuition • A satisfactory knowledge of the subject is demonstrated • The discussion of the topic shows some insight • The conclusions summarise the work, but some aspects are missing • The report contains a number of misconceptions or misunderstandings • The report as a whole shows that the student has a satisfactory understanding of the subject
Weak (3rd Class)	<ul style="list-style-type: none"> • Poor report structure with some sections absent or not clearly differentiated • Many spelling, punctuation and grammatical errors • Poor writing style • Badly formatted tables/figures, inadequate captions • Some relevant references included/cited from limited sources • Some unnumbered equations or undefined symbols 	<ul style="list-style-type: none"> • The abstract is poorly written, and has vital information missing • The motivation is barely described • Substantial relevant background is missing or poorly presented • The introductory sections would be unintelligible to a non-expert • The implications of the topic have not been grasped by the student • Future work/directions are only mentioned as a general concept 	<ul style="list-style-type: none"> • The report is a poor summary of the topic • Several relevant aspects are missing • The presentation of sub-topics is unbalanced • Insufficient sources have been used to prepare the report • Important equations are missing (or unnecessary equations are rife) • There is unsatisfactory use of figures/diagrams in the report • Units have been sparingly used • There are a number of errors 	<ul style="list-style-type: none"> • The report reveals little physical intuition • A shallow knowledge of the subject is demonstrated • The discussion of the topic is very limited • The conclusions could be substantially improved • The report contains some substantial misconceptions or misunderstandings • The report as a whole shows that the student has a poor understanding of the subject
Fail	<ul style="list-style-type: none"> • Very poor report structure with important sections completely missing • Riddled with spelling, punctuation and grammatical errors • Totally inappropriate or incomprehensible writing style • Very badly formatted or missing tables/figures or captions • Few relevant references, improperly cited • Unnumbered equations and many undefined symbols 	<ul style="list-style-type: none"> • The abstract is very badly written or completely missing • The motivation for the work has not been discussed • Relevant background is completely missing or very poorly presented • The introductory sections are confused and unintelligible, even for an expert • The implications of the topic have not been discussed by the student • There is no mention of future work/directions 	<ul style="list-style-type: none"> • The report fails to describe the topic • Important aspects of the topic missing • The presentation of sub-topics is completely unbalanced • Insufficient and inappropriate sources have been used to prepare the report • Crucial equations are totally absent • The report lacks essential figures and diagrams • Units have mostly been ignored • There are many errors 	<ul style="list-style-type: none"> • The report reveals an absence of physical intuition • The student has almost no knowledge of the subject • The discussion of the topic is essentially missing • The conclusions are largely incorrect • The report contains many substantial misconceptions or misunderstandings • The report as a whole shows that the student has almost no understanding of the subject

Assessment Guidelines for PHYS451 Reports

University scale	Presentation (10%)	Motivation & purpose (5%)	Content (20%)	Understanding (15%)
Exceptional (1 st Class)	<ul style="list-style-type: none"> Exceptional and innovative report structure, superbly laid out No spelling, punctuation and grammatical errors Excellent clear and highly readable writing style Near-perfectly presented tables/figures with very clear captions (self-contained) A broad range of relevant references from multiple sources properly included and cited, indicating an excellent knowledge of the field Equations are numbered, perfectly formatted, symbols are clearly defined 	<ul style="list-style-type: none"> An exceptional abstract succinctly describes the project and excites the reader Novel/important motivation for the work is identified, and excellently described in all its implications The description of the background reveals a complete and deep understanding of the subject The report is highly accessible to a non-expert reader Profound implications of the results have been excellently described Suggested further work is innovative and exciting 	<ul style="list-style-type: none"> The method is very concisely, precisely and convincingly described An expert would find the method impressive The results presented form a completed piece of original research The work is of publishable quality Key results are prominent, data is innovatively & compellingly presented Results have been subject to advanced analysis and errors/approximations are clear Units have been correctly used and applied throughout There are no numerical errors 	<ul style="list-style-type: none"> The interpretation of the results demonstrates a remarkable physical intuition The discussion of the data is outstanding Comparison with previous theory/experiment reveals a deep knowledge of the subject The conclusions capture the essence of the work and reveal its importance The report as a whole shows that the student has an exceptional understanding of the subject
Excellent (1 st Class)	<ul style="list-style-type: none"> Excellent report structure, well laid out and with all relevant sections included Very few spelling, punctuation and grammatical errors Very good writing style Clearly and well presented tables/figures with clear captions (self-contained) A range of relevant references properly included and cited from multiple sources Equations are numbered, well formatted and symbols defined 	<ul style="list-style-type: none"> There is a clear, concise and very well written abstract that briefly describes the project, states the main result and its implications The motivation for doing the work is excellently described All relevant background to the work is clearly and concisely presented The introductory sections are highly accessible to a non-expert reader The implications of the results have been understood and are clearly presented Suggested further work has been very well considered 	<ul style="list-style-type: none"> The method is concisely, precisely and convincingly described Sufficient information is included for an expert to reproduce the work Results presented form a complete work The quality of the scientific work is excellent Key results are prominent and data is in condensed form (e.g. a graph) Results are properly analysed and errors/approximations are indicated Units have been correctly used and applied with a few exceptions There are 1 or 2 small numerical errors of very minor importance 	<ul style="list-style-type: none"> The interpretation of the results demonstrates excellent physical intuition The discussion of the data is excellent Comparison with previous theory/experiment reveals an excellent knowledge of the subject The conclusions capture the essence of the work The report as a whole shows that the student has an excellent understanding of the subject
Good to very good (Upper 2 nd Class)	<ul style="list-style-type: none"> Good report structure with all relevant sections included A few spelling, punctuation and grammatical errors Good writing style Clear tables/figures with captions Relevant references properly included and cited Equations are numbered and symbols defined 	<ul style="list-style-type: none"> The abstract is generally well written but could be improved The motivation for doing the work is well described Most relevant background to the work is well presented Reading the introductory sections requires a little expert knowledge The implications of the results are generally well presented Suggested further work has been included, but needs further thought 	<ul style="list-style-type: none"> The method is well described An expert would need to assume some details to reproduce the work Some further results would have improved the project The quality of the scientific work is good to very good Key results are stated and data is in condensed form (e.g. a graph) Results are analysed, errors/approximations are usually indicated Units have been correctly used and applied with several exceptions There are a few numerical errors of minor importance 	<ul style="list-style-type: none"> The interpretation of the results demonstrates good physical intuition The discussion of the data is well thought out Comparison with previous theory/experiment reveals a good knowledge of the subject The conclusions nicely summarise the work The report as a whole shows that the student has a good understanding of the subject

Satisfactory to good (Lower 2 nd Class)	<ul style="list-style-type: none"> Satisfactory report structure with nearly all relevant sections included Several spelling, punctuation and grammatical errors Acceptable writing style Tables/figures with captions Most references are relevant, properly included and cited Some unnumbered equations or undefined symbols 	<ul style="list-style-type: none"> The abstract is not very clearly written, or has some relevant information missing The motivation for doing the work is adequately described Some relevant background is missing or poorly presented A non-expert would have difficulty with a substantial part of the introductory sections Most implications of the results are described Further work has been vaguely discussed 	<ul style="list-style-type: none"> The method is satisfactorily described An expert would have difficulty to reproduce the work More results should have been obtained The quality of the scientific work is satisfactory Key results are included but not identified as such Some analysis of results, limited account of errors/approximations Units have mostly been correctly used There are several numerical errors of minor importance 	<ul style="list-style-type: none"> The interpretation of the results demonstrates some physical intuition The discussion of the data shows some insight Comparison with previous theory/experiment reveals some knowledge of the subject The conclusions summarise the work, but some aspects are missing The report as a whole shows that the student has a satisfactory understanding of the subject
Weak (3 rd Class)	<ul style="list-style-type: none"> Poor report structure with some sections absent or not clearly differentiated Many spelling, punctuation and grammatical errors Poor writing style Badly formatted tables/figures, inadequate captions Some relevant references included/cited from limited sources Some unnumbered equations and undefined symbols 	<ul style="list-style-type: none"> The abstract is poorly written, and has vital information missing The motivation is barely described Substantial relevant background is missing or poorly presented The introductory sections would be unintelligible to a non-expert The implications of the results are have not been grasped by the student The need for further work is only mention as a general concept 	<ul style="list-style-type: none"> The method is poorly described An expert would not be able to reproduce the work The work is incomplete The quality of the scientific work is weak Key results are buried Limited analysis of results & of errors/approximations Units have been sparingly used There are several numerical errors 	<ul style="list-style-type: none"> The interpretation of the results demonstrates little physical intuition The discussion of the data is very limited Comparison with previous theory/experiment reveals a shallow knowledge of the subject The conclusions could be substantially improved The report as a whole shows that the student has a poor understanding of the subject
Fail	<ul style="list-style-type: none"> Very poor report structure with important sections completely missing Riddled with spelling, punctuation and grammatical errors Totally inappropriate or incomprehensible writing style Very badly formatted or missing tables/figures or captions Few relevant references, improperly cited Unnumbered equations and many undefined symbols 	<ul style="list-style-type: none"> The abstract is very badly written or completely missing The motivation for the work has not been discussed Relevant background is completely missing or very poorly presented The introductory sections are confused and unintelligible, even for an expert The implications of the results are have not been discussed by the student There is no mention of further work 	<ul style="list-style-type: none"> The method is badly described Much vital information is missing The work was hardly started The quality of the scientific work is bad No key results to be found (Almost) no analysis of results & of errors/approximations Units have mostly been ignored There are many numerical errors 	<ul style="list-style-type: none"> The interpretation of the results is largely absent There is almost no discussion of the data There is no comparison with previous theory/experiment The conclusions are largely incorrect The report as a whole shows that the student has almost no understanding of the subject