

Rubric Experiment Practicum Statistical Physics NS-204B 2022-2023

Criteria	Absent (0%)	Poor (40%)	Satisfactory (65%)	Good (85%)	Excellent (100%)
Project (60 pt)					
Data analysis and interpretation (valid statistical analysis (fit routines, calculation of uncertainties), qualitative and quantitative comparison to theory)	<ul style="list-style-type: none"> - Invalid analysis or no analysis at all 	<ul style="list-style-type: none"> - Lots of input required by supervisor or fellow students - Limited use of statistical tools and information - Qualitative interpretation 	<ul style="list-style-type: none"> - Correct statistical analysis, yet standard and perhaps with some help - Direct implications for interpretation are supported by (quantitative) analysis 	<ul style="list-style-type: none"> - Without help, standard techniques are correctly implemented - Minor effects are observed after a careful analysis and interpretation 	<ul style="list-style-type: none"> - Correct analysis of large sets of data, or extra effort by implementing advanced processing techniques - Analysis leads to detailed quantitative interpretation and understanding, and concrete suggestions for future improvements
Score 12					
Technical and experimental skills (mastering setup, working independently, quality and validity of results, data sets exhaustive and/or corresponding to plan of work, clean and safe workspace)	<ul style="list-style-type: none"> - Fails to master and apply techniques individually - Quality of data is such that no sensible conclusions can be drawn from it - Workspace is a mess, leading to hazardous and error-prone situations 	<ul style="list-style-type: none"> - Regularly fails to master and apply techniques individually - Quality of data such that qualitative comparison to model can be performed - Fails to clean workspace and/or equipment after use 	<ul style="list-style-type: none"> - Masters technical and lab skills, some help required - Limited amount of good quality data is obtained, quantitative comparison to model can be performed - Safe working environment 	<ul style="list-style-type: none"> - Masters and applies lab and technical skills and applies techniques individually - Substantial amount of good quality data is obtained: several replications of experiment that are largely in agreement - Cleans workspace and equipment regularly 	<ul style="list-style-type: none"> - Finds and masters new technical approaches - Improves existing or suggested procedures - Large amount of high quality data is obtained; various replications in the form of a check of dependence of an experimental condition or relevant parameter - Workspace and equipment are always clean and organized
Score 12					
Efficiency and time management (work efficiently and on schedule)	<ul style="list-style-type: none"> - Misses so many contact hours that project suffers severely 	<ul style="list-style-type: none"> - Misses contact hours leading to suboptimal project results - Waiting times are spent inefficiently 	<ul style="list-style-type: none"> - Uses waiting times for reading, writing report sections, processing etc. 	<ul style="list-style-type: none"> - See Satisfactory + - Results are quickly made presentable 	<ul style="list-style-type: none"> - See Good + - Efficiency is such that an extraordinary amount of work has been performed
Score 6					
Organization of lab journal and digital data (lab journal contains log per lab meeting, notes during preparation, settings and conditions during experiments, other relevant observations, references to data files digital data is stored in a transparent and logical structure)	<ul style="list-style-type: none"> - Crucial information is not recorded and/or - Lab journal has not been used - Digital data are absent or unreferenced 	<ul style="list-style-type: none"> - Global overview of actions per meeting but no information about experimental preparations, settings and observations - Lab journal badly organized - Messy storage of digital data 	<ul style="list-style-type: none"> - Global overview of actions per meeting - Global description of settings and observations for measurement runs used in article - Digital data and directory structure 	<ul style="list-style-type: none"> - See Satisfactory + - Lab journal augmented by relevant comments in preparatory phase - Good digital organization of full project 	<ul style="list-style-type: none"> - See Good + - Comments during full project "by the book"; each measurement is traceable and accompanied by a good description of settings and observations
Score 9					
Critical attitude (critical towards own research and methods, insight in relevance of obtained data)	<ul style="list-style-type: none"> - No self-reflection or critical attitude - No intellectual effort has been made - Overlooks or neglects the fact 	<ul style="list-style-type: none"> - Some reflection on project achievements - No critical attitude towards own methods and habits - Limited understanding of the 	<ul style="list-style-type: none"> - Shows self-reflection and critical attitude towards (own) research, after finishing the project - Observes and discusses 	<ul style="list-style-type: none"> - Critical attitude towards own methods and habits - Oral and written argumentation demonstrates insight in the value of 	<ul style="list-style-type: none"> - Critical in such a way that it leads to improved performance during the project - Oral and written

	that data are flawed	added value of data	consistency with model / expectations	obtained results	argumentation on academic level; excellent insight in value of data in the context of the research question
Score 15					
Perseverance and dedication	- Activities show no motivation	- Loses motivation when experiments fail	- Sticks to the plan despite setbacks in the process	- Repeats experiment until a good result is obtained, and not afraid to alter approach compared to the original plan	- Steps up when it gets hard - Perseveres but knows when to stop
Score 6					
Integrity* (working accurately and trustworthy)	- Fraud: Data fabricated or manipulated - Plagiarism: Data/code/article text copied from fellow student or obtained otherwise				- Student is trustworthy and reliable, responsible and accurate
Score -					

* In some cases of plagiarism (copying work from fellow students or literature while presenting it as own work) or fraud (data fabrication or manipulation), the instructors will inform the Board of Examiners (BoE) in writing. The BoE then decides on whether fraud or plagiarism was committed, and which measures are required.

Fraud will always be reported to the BoE. In case of plagiarism, the instructors:

- Issue a formal warning when:
 - a sentence or more is literally copied from other work (instruction, web resources or publications) with or without a reference
- Report to BoE when one (or more) of these apply:
 - Instead of a second formal warning (only one formal warning will be given)
 - (Partially) copied work from fellow students

More information can be found in the Onderwijs- en Examenregeling (OER), Art. 5.14

<https://students.uu.nl/files/beta-ugs-oerpdf>

Criteria	Absent (0%)	Poor (40%)	Satisfactory (65%)	Good (85%)	Excellent (100%)
Article (40 pt)					
Title (informative, drawing attention, representative)	- Erroneous (e.g. "SIM1", "StatFys") or missing	- Does not justify contents - Suggests incorrect or overinterpretation of data	- Represents contents - Somewhat formal, basic or lengthy	- Represents contents in a fluent, natural way - Invites to read	- See Good + - Creative and original, attracts attention
Score 2					
Abstract (short but complete, reference to method and obtained results)	- Several required components (research question/aim, methods, results, discussion/qualification, conclusion) missing - Misrepresentation of contents or outcomes	- Abstract cannot be understood without prior reading of (parts of) the report - Two of required components are missing - Downplays or overemphasizes results	- One required component is missing - Can be understood without prior reading of report	- All components are present - Can be understood without prior reading of report - Main achievements and insights are highlighted	- All components are present - All important insights are highlighted and realistically qualified - Concise and self-explaining
Score 4					
Introduction (broad scope and sketch of context, funnel structure, research question, overview of activities)	- Research question/aim absent - No referencing to external sources - No perspective (historical, methodical, physical)	- Referencing is incomplete - Research question has not been established clearly - No funnel structure and/or too lengthy	- Research question properly defined - Basic overview of literature - Weak funnel structure	- See Satisfactory + - Relevance of research question is adequately established - Concise, not too lengthy	- See Good + - Logical and friendly zoom from broad context to research question - Relevance of research question is supported by use of references
Score 4					
Theory (integration knowledge from secondary sources, theory compact and in a nutshell, possibly including sketch or example calculation, treatment of physical mechanisms, clear relation between variables in theory and quantities measured, references to studied literature)	- Crucial equations or insights are missing, or - Presented theory has no relation to performed research	- Theory contains crucial information but cannot be understood without consulting secondary sources - Physical mechanisms remain vague - Poor use of external references - Relation of theory to experiments remains vague - Irrelevant and/or too long derivations	- Contains crucial steps and equations, and is clear without consulting secondary sources - Physical mechanisms are basically explained - Perhaps somewhat lengthy - Link to (quantities in) experiments is there, but could be strengthened - Appropriate referencing to secondary sources	- Balanced length and reading load - Physical mechanisms are treated in a structured manner - Arguments for hypothesis are clear after reading this section	- See Good + - Concise presentation - Fully integrated in the report, relevance to later sections is apparent - Assumptions and crucial points highlighted
Score 3					
Method (describes algorithm and made assumptions, (possibly) schematic of method, purpose, operation and accuracy, connection to theory, procedure and points of attention)	- Redoing the experiment based on the presented information is impossible - Does not add to understanding, interpretation or appreciation of obtained results - Important properties of setup or method remain unmentioned	- Some information required to redo the experiment is missing - Information is sufficient to understand main experimental tasks - Some irrelevant or confusing remarks - Redundant information from e.g. plan of work/assignment present	- Results and actions are clear when having read this section - Allows for redoing the experiment - Graphic from instruction or secondary source used for clarification - No redundant information	- See Satisfactory + - Some cross-referencing to Theory - Augmented or commented graphic from instruction or secondary source - Description of method contains details required to justify results	- See Satisfactory + - Self-designed graphics that greatly help understanding setup and/or method - Good referencing to theory - Crucial setup properties and steps in method identified, highlighted and clearly explained
Score 4					
Results (qualitative comparison of measurement and	- Figures not described in text - Invalid or absent description,	- No reference to floats in text	- Correct references to figures or tables in main	- Processing is tractable - Some referencing to	- Selection and order of figures guide reader

theory, quantitative analysis and interpretation (fit routines, reduced chi-squared, propagation of uncertainties), graphs, tables and captions according to requirements, (if necessary) selection of relevant / illustrative data sets)	analysis or interpretation - No concrete, quantitative outcomes of the experiment are presented	- Interpretation is absent or vague - Limited presentation of analysis results (statistical information, obtained values, ...) - Only 'final results' figure/table - The same data is presented twice (i.e. in table and figure form)	text - Results of analysis and (basic) correct interpretation are reported - Contains both 'final results' figure and (a) figure(s) showing raw data and/or intermediate results	information in Theory or Setup and Method - Relevant selection of presented data - Interpretation and line of thought presented logically	through data gathering, processing and analysis - Relevant details regarding the experimental process are subtly woven into the text - Convincing account of project work, including analysis and interpretation
Score 5					
Discussion (data processing details, discussion of correspondence theory / expectation / literature value and model, relation to research question, critical evaluation of plan of work - procedure followed - data sets - time schedule, possible (concrete) improvements)	- Invalid argumentation, trivial remarks or a repetition of statements from the Results section	- Discussion does not add new insights - Rigidly sticking to existing concepts - Qualitative argumentation where quantitative is expected/possible	- Relevant arguments connecting research question to data and results after analysis - Some quantitative arguments valuating results - Adequate discussion of strengths and weaknesses of method and project	- See Satisfactory + - Concise, sensible discussion of data in relation to research question - Discussion of experimental/processing details adding to the readers understanding - (Semi)-quantitative analysis based on results - Cross-referencing to previous parts of the report	- Complete, critical and balanced discussion of data, strengths, limitations, new insights and hypotheses - Qualification of the results in the light of existing literature, current knowledge and/or expectations
Score 5					
Conclusion (short answer to research question, results in perspective, suggestions for future research)	- Fails to answer research question or state main results of the project, or - Conclusions are not supported by (experimental) evidence	- Presentation of new information - Weakly supported by evidence - Near-literal repetition of Discussion	- Research question and main results are mentioned - Conclusions are supported by (experimental) evidence	- Research question and main results stated strongly and well supported by experimental results - Weak suggestions for future research and/or placing work and results in a broader perspective	- Concise, sensible and complete conclusions - Valid, supported suggestions for future research and/or convincingly placing results in perspective
Score 3					
Structure (clear line of thought, well-structured text, correct level for intended reader)	- No clear line of thought at both full text and section level - Text seems constructed from unconnected pieces of subtext - Unclear or incomplete sectioning - Level far too high/low for the intended reader	- Text is fairly structured at section level, but fragmented at full text level - Level too high/low for intended reader at several points	- Line of thought clear at section level and mostly at full text level - Appropriate level for intended reader	- Logical structure, supports legibility - Line of thought always clear - Appropriate level for intended reader	- Line of thought easy to follow - Reading report improves the intended reader's insight in the subject
Score 3					
Style and language (transparent lay-out, spelling and language, concise use of references)	- Disturbing spelling/grammar errors - Excessive use of appendices, figures etc. - Several parts of text give contradictory information - Either very wordy or too concise - Literature references are missing	- Frequent spelling/grammar errors - Definitions of symbols missing - Parts of text are incomplete or overcomplete - Bibliography references are badly formatted	- Occasional spelling/grammar errors - Lay-out as specified - Bibliography references are present where needed and correctly formatted	- No spelling/grammar errors - Lay out: see Satisfactory - Style and choice of words enable understanding the subject - Bibliography references are present where needed and correctly formatted	- Spelling/grammar and Lay-out: see Good - Choice of words, order and timing of information improve understanding - Writing flows smoothly - Properly timed use of literature references - Insightful literature references support broader context/theory
Score 2					

Figures and tables (Have captions and are self-explanatory, attention to lay-out, complete axis labels, units, uncertainties, appropriate information density per graph)	<ul style="list-style-type: none"> - No axis labels - No legend - Captions are missing - Difficult to read 	<ul style="list-style-type: none"> - Too many or too few data sets per graph - Incorrect or incomplete axis labels/legend - Some captions are missing - Units and/or uncertainties missing - Caption text is repetitive - Suboptimal plot range/point-size/line thickness/resolution 	<ul style="list-style-type: none"> - Minimal lay-out - Axis labels and captions present and correct - Captions function as simple titles instead of aiding independent interpretation of figures/tables 	<ul style="list-style-type: none"> - Clear figure lay-out - Axis labels and captions present and correct - Captions make figures/tables self-explanatory - Uncertainties and units are evident - Ideal plot range/point-size/line thickness/resolution 	<ul style="list-style-type: none"> - See Good + - Lay-out enhances understanding - Figures and tables guide the story of the article - Data in figures and/or tables (including captions) presented in the best possible way
Score 5					