

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

Criteria	Absent (0%)	Poor (40%)	Satisfactory (65%)	Good (85%)	Excellent (100%)
Simulation program (50 pt)					
Code purpose The script is written with one task in mind: Produce the results that help you answer your research question. Results can either be numerical or graphical.	<ul style="list-style-type: none"> - Errors (syntax) occur that prevent the user to obtain any result at all. - Running the script does not produce results relating to the research question. 	<ul style="list-style-type: none"> - Basic simulation is running - No analysis of measurements 	<ul style="list-style-type: none"> - Analysis (including plotting) of multiple measurements is possible - Basic research question and data interpretation 	<ul style="list-style-type: none"> - Some testing to determine optimal parameter values has been done. - Relevance of research question well-supported by pilot experiments 	<ul style="list-style-type: none"> - See Good + - Research question is either thoroughly investigated or very interesting/unique
Score 10					
Modularity A good program should be modular in the sense that the various tasks are logically separated. Tasks may consist of subtasks. In Python this usually means that various functions are defined.	<ul style="list-style-type: none"> - No functions are defined - The script is a sequence of arithmetic operations with many repetitions of lines of code that are (almost) identical. - Loops are only used in the core of the simulation 	<ul style="list-style-type: none"> - Graphical results presented in the article are not generated in the script but with some other tool. - Results are obtained from a sequence of calculations with many (unnecessary) repetitions. - Hardly any loop structures are used in analysis 	<ul style="list-style-type: none"> - Some functions are defined or loops used to repeat experiments with different parameter values - Running the script generates results that are presented in the article. - This process is not automated. So it is necessary to run the script several times with minor changes in order to reproduce ALL results. 	<ul style="list-style-type: none"> - All methods/algorithms are defined in functions. - While/Do/For loop-structures are used to repeat calculations for different values of parameter(s). - Running the script generates results that are presented in the article - Analysis and presentation (plotting/numerical output) for different parameters is fully automated by use of loop-structures or functions 	<ul style="list-style-type: none"> - The script is organized such that it is easy for a user to generate other interesting results as well. The user is actually invited to use the script to do additional research. - All methods/algorithms and analysis tools are defined in functions. - Numerical results are written to file.
Score 10					
Correctness and efficiency Correct: Does the script really do what it is supposed to do and are the computations efficient (=fast). Parameter values are chosen such that no time is spoilt on needless operations.	<ul style="list-style-type: none"> - There are severe errors (no Python syntax errors are meant here) that prevent drawing any useful conclusion. (Such as not accounting for occupied spaces/wrong equations for calculations) 	<ul style="list-style-type: none"> - There are some errors but the behavior of the simulation is not seriously affected. (Such as small counting/boundary-condition errors) 	<ul style="list-style-type: none"> - The script does what it is supposed to do, at least no errors are found by the TA. - Efficiency is not good; either by poor choice of parameter values or by inefficient data handling much time is spoilt. 	<ul style="list-style-type: none"> - The script does what it is supposed to do. - Efficiency is reasonable but can be improved. 	<ul style="list-style-type: none"> - The script does what it is supposed to do. - The implementation is efficient.
Score 10					
Use of variables and parameters Meaningful names of variables used in the script helps to make it more readable. Parameters are special variables (like temperature, number of quanta, particle density etc.) that are initialized at some value. As a rule of thumb numbers are not used in your program, except when initializing or changing parameters. Iterators are of course allowed.	<ul style="list-style-type: none"> - Meaningless names of variables are used throughout the script. - Many numerical values occur throughout the script and hardly any parameter names are used. 		<ul style="list-style-type: none"> - Variable-names are often not very meaningful or very long. - Some parameters have names, but in the code still various numerical quantities are used. 		<ul style="list-style-type: none"> - No unnecessary numerical values are used in expressions. - Use of meaningful variable names with a uniform style. (like e.g. use of capital letters, underscores). - It is clear which parameters are assumed to remain fixed throughout the simulation and which parameters may be varied in order to generate new results for further research.
Score 6					

Comments When writing a script it should be clear what is being calculated. The easiest way to do so is to add comments written in a natural language. This holds for the script as a whole, but also for the functions that are defined within the script or even for lines of code in your script that may need further explanation.	- No commenting in the code.	- Comments in the script are not helpful to better understand what is happening.	- Short comments per section of script - Main parameters are explained in comments.	- It is clear what each part of the script is for. - All parameters that occur in the script are explained in comments. - Each function or loop has a short description of what it is doing.	- See Good + - Each function has a short description of what it is doing, and how it should be used. (For example by use of docstrings.)
Score 6					
Complexity and depth Depth of exploration of the topic	- Investigation does not go further than what is described in Sec 2	- Test parameters from Sec 2 are investigated systematically	- One of the suggested research topics from Sec 3 is investigated thoroughly	- Multiple topics from Sec 3 are combined into a single coherent story	- Extensive exploration of the topic - Unique and insightful perspective or approach
Score 8					
Integrity *	- Fraud: Data fabricated or manipulated - Plagiarism: Data/code/article text copied from fellow student or obtained otherwise				- Student is trustworthy and reliable
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>

Note: Article criteria are graded on the submission after peer feedback!

Criteria	Absent (0%)	Poor (40%)	Satisfactory (65%)	Good (85%)	Excellent (100%)
Article (40 pt)					
Title (informative, drawing attention, representative)	- Erroneus (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 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)	<ul style="list-style-type: none"> - Figures not described in text - Invalid or absent description, analysis or interpretation - No concrete, quantitative outcomes of the experiment are presented 	<ul style="list-style-type: none"> - No reference to floats in text - 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) 	<ul style="list-style-type: none"> - Correct references to figures or tables in main 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 	<ul style="list-style-type: none"> - Processing is tractable - Some referencing to information in Theory or Setup and Method - Relevant selection of presented data - Interpretation and line of thought presented logically 	<ul style="list-style-type: none"> - Selection and order of figures guide reader 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)	<ul style="list-style-type: none"> - Invalid argumentation, trivial remarks or a repetition of statements from the Results section 	<ul style="list-style-type: none"> - Discussion does not add new insights - Rigidly sticking to existing concepts - Qualitative argumentation where quantitative is expected/possible 	<ul style="list-style-type: none"> - 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 	<ul style="list-style-type: none"> - 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 	<ul style="list-style-type: none"> - 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)	<ul style="list-style-type: none"> - Fails to answer research question or state main results of the project, or - Conclusions are not supported by (experimental) evidence 	<ul style="list-style-type: none"> - Presentation of new information - Weakly supported by evidence - Near-literal repetition of Discussion 	<ul style="list-style-type: none"> - Research question and main results are mentioned - Conclusions are supported by (experimental) evidence 	<ul style="list-style-type: none"> - 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 	<ul style="list-style-type: none"> - 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)	<ul style="list-style-type: none"> - 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 	<ul style="list-style-type: none"> - Text is fairly structured at section level, but fragmented at full text level - Level too high/low for intended reader at several points 	<ul style="list-style-type: none"> - Line of thought clear at section level and mostly at full text level - Appropriate level for intended reader 	<ul style="list-style-type: none"> - Logical structure, supports legibility - Line of thought always clear - Appropriate level for intended reader 	<ul style="list-style-type: none"> - 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)	<ul style="list-style-type: none"> - 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 	<ul style="list-style-type: none"> - Frequent spelling/grammar errors - Definitions of symbols missing - Parts of text are incomplete or overcomplete - Bibliography references are badly formatted 	<ul style="list-style-type: none"> - Occasional spelling/grammar errors - Lay-out as specified - Bibliography references are present where needed and correctly formatted 	<ul style="list-style-type: none"> - 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 	<ul style="list-style-type: none"> - 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					

Criteria	Absent (0%)	Poor (40%)	Satisfactory (65%)	Good (85%)	Excellent (100%)
Feedback (10 pt)					
Giving peer feedback (balanced set of comments, quality of comments (lay-out, style and contents), setting priorities, suggestions on improvement)	<ul style="list-style-type: none"> - Comments are disrespectful or by no means useful to the authors 	<ul style="list-style-type: none"> - Comments are vague, very general or not constructive 	<ul style="list-style-type: none"> - Poses useful comments on both lay-out, style and contents of a report - Delivers comments constructively and respectfully - No priorities in feedback 	<ul style="list-style-type: none"> - See Satisfactory + - Is capable of highlighting priorities in feedback - Shows understanding of scientific interpretation by commenting on method/analysis techniques 	<ul style="list-style-type: none"> - Gives a balanced overview of the work, with an emphasis on features crucial to the research question and line of thought while not neglecting lay-out and style. - Gives suggestions on how to improve text or presentation. - Gives scientifically helpful suggestions
Score 10					