NORGES IDRETTSHØGSKOLE

TEMPLATE ASSESSOR'S GUIDE

The assessor's guide is prepared by the person(s) who creates the assignment/question bank for each exam and is prepared at the same time as the examination questions.

The assessor's guides must be available for the students after the grades have been determined, in accordance with the Higher Education Act § 5-3 (3) - https://lovdata.no/lov/2005-04-01-15/§5-3

General information

Course information	**Scientific Method and Statistics**
Course code	MET 401
Course name	**Scientific Method and Statistics**
Academic year semester	2026
Credits	10
Course coordinator	Jostein Steene-Johannessen
Examination type	Written school examination

The template is adapted to the type of examination/assessment form.

Documents that must be available to the assessor in the assessors's guide

- Examination questions (not necessary for FLOWmulti/multiple choice)

- Link to course description

- Information given to students about the specific exam

Learning outcomes

The examination is linked to the following learning outcomes:

• Describe the research designs most commonly used in sports medicine and exercise physiology research, and assess which designs are suitable for answering different research questions.

• Critically discuss research findings in light of methodological quality and the sensitivity, reliability and validity of measurement methods.

• Analyse, present and interpret statistical analyses that examine relationships between variables in different research designs.

• Reflect independently on principles of research ethics and comply with norms for responsible research.

• Explain the different stages of the research process.

Syllabus/subject matter

• O'Donoghue, P. (2012). Statistics for sport and exercise studies: An introduction. Routledge.

• Thomas, J. R., Nelson, J. K., & Silverman, S. J. (2022). Research methods in physical activity (8th ed.). Human Kinetics.

• Lectures, video lectures and digital learning resources in Canvas.

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Teaching

Lecture plan and/or timetable is attached. If applicable, comment on the emphasis on different parts of the syllabus in the teaching, the teaching methods used, and any other information about the implementation of the teaching/subject that is relevant to be able to assess the answers in the best possible way. In the case of independent assignments, have the students received guidance along the way?

General assessment criteria

A: Outstanding response. The candidate demonstrates excellent understanding of research design, choice of analysis, methodological quality and interpretation. The response is precise, nuanced and critically reflective.

B: Very good response. The candidate demonstrates solid understanding, although some explanations or links between method and interpretation may be less fully developed.

C: Satisfactory response. The candidate demonstrates basic understanding, but the analyses or reflections lack depth or precision in places.

D: Weak but acceptable response. The response contains several academic weaknesses, but some relevant understanding is demonstrated.

E: Minimum pass. The candidate demonstrates very limited understanding and provides fragmented or insufficiently supported reflections.

F: Fail. The response demonstrates inadequate understanding of central concepts or contains fundamental methodological errors.

Task 1 Statistical analysis and presentation I (20 points)

A Prevalence estimation (7 points)

Expected content:

Calculate the prevalence of meeting the guideline separately for women and men. Report the number of participants, prevalence as a percentage, and 95% confidence intervals.

Assess the difference using a cross-tabulation and a chi-square test. Logistic regression with sex as the explanatory variable is also acceptable.

Report the absolute difference in percentage points and/or an appropriate relative effect estimate with a 95% confidence interval and p-value. The reference group should be stated.

Part B Analysis of associated factors (8 points)

Expected content:

- Treat meeting the guideline as a binary outcome. Logistic regression is an adequate choice for examining associations with education, current smoking and diet score.
- Education should be represented by categories with a stated reference group, smoking as a binary variable, and diet score as a continuous variable or meaningful categories.
- Describe crude analyses and an adjusted model. Adjustment should at least consider age and sex and should be justified in relation to possible confounding.
- Report odds ratios with 95% confidence intervals.

Part C Assumptions and presentation (5 points)

Expected content:

- Relevant basic considerations include independent observations, correct coding, adequate numbers in the categories

- Present frequencies and percentages for categorical variables and an appropriate central measure and spreading measure for continuous variables.
- Present crude and adjusted effect estimates with confidence intervals and identify reference groups. Interpretation should describe association rather than causation.

Task 2 Statistical analysis and presentation II (20 points)

Part A Analysis choice (7 points)

Expected content:

- Use simple and multiple linear regression with quality-of-life score as the outcome and daily moderate-to-vigorous physical activity as the exposure.
- A crude model and a model adjusted for confounders such as age, sex, education, smoking and diet are expected. Covariate selection should be justified.
- The candidate should consider whether the relationship is reasonably linear, for example by inspecting a scatterplot or comparing the pattern across activity levels.

Part B Assumptions (4 points)

Expected content:

- The main assumptions include independent observations, an approximately linear relationship, residuals with reasonably constant variance and no outliers. Approximate normality of residuals is relevant
- A basic explanation of how plots or residual checks could be used is sufficient.

Part C Presentation (4 points)

Expected content:

- Describe physical activity and quality of life using mean and standard deviation or median and interquartile range, depending on the distributions.
- Report regression coefficients for a meaningful increase in activity, preferably 30 minutes per day, with 95% confidence intervals and p-values for crude and adjusted models.
- A scatterplot with a fitted line and a concise regression table are suitable forms of presentation.

Part D Interpretation (5 points)

Expected content:

- The result means that an additional 30 minutes of moderate-to-vigorous physical activity per day is associated with an estimated 1.8-point higher quality-of-life score after adjustment for the listed variables.
- The 95% confidence interval indicates that values from 0.9 to 2.7 points and $p < 0.001$ indicates statistical evidence of an association.
- The result is cross-sectional and does not show that increasing activity causes improved quality of life. The practical importance of a 1.8-point difference should also be considered.

Task 3 Statistical analysis and presentation III (20 points)

Part A Analysis choice (7 points)

Expected content:

- Use binary logistic regression with obesity as the outcome and meeting the physical-activity guideline as the exposure. Describe both crude and adjusted analyses.
- Covariates may include age, sex, education, smoking and diet, but their inclusion should be justified as possible confounders.
- Other basic and suitable methods for estimating an association may receive credit when the resulting effect measure is correctly named and interpreted.

Part B Assumptions (5 points)

Expected content:

- Relevant assumptions and considerations include independent observations, correct binary coding, adequate numbers with and without obesity, and multicollinearity.

Part C Presentation and interpretation (8 points)

Expected content:

- Report the number and proportion with obesity in each activity group, together with crude and adjusted odds ratios, 95% confidence intervals and p-values.
- An adjusted odds ratio of 0.68 means that adults meeting the guideline have an estimated 32% lower odds of obesity than adults not meeting it, conditional on the included variables.
- The confidence interval from 0.57 to 0.82 excludes 1 and $p < 0.001$ indicates statistical evidence of an association.
- Because the data are cross-sectional, temporal order and causality cannot be established.

Task 4 Measurement methods and uncertainty (20 points)

Part A Strengths weaknesses and suitability (7 points)

Expected content:

- Hathorne, social desirability and recall

Part B Measurement error misclassification and missing data (7 points)

Expected content:

- Distinguish random variation from systematic measurement error and explain how either may influence prevalence estimates or associations.
- Classification at thresholds may place some participants in the wrong activity or obesity category. The candidate should recognise that this can weaken or otherwise distort associations
- Missing accelerometer, anthropometric or dietary information may reduce precision and may introduce bias if missingness is related to the variables being studied.

Part C Reliability validity and standardization (6 points)

Expected content:

- Reliability: concerns whether repeated measurements give reasonably consistent results.

Validity: concerns whether the method measures the construct with acceptable accuracy. Acc vs direct observation and comparison of the diet index with a criteria method

- Standardization: instructions, equipment, measurement procedures and data processing improve comparability and reduce avoidable variation between participants.

Task 5 Overall methodological reflection (20 points)

Theme: Study design, external validity, causal interpretation, participant selection and research ethics.

Part A Design and research process (4 points)

Expected content:

- A cross-sectional design is suitable for estimating prevalence and describing associations at one point in time, but it cannot establish whether the exposure occurred before the outcome.

Part B Generalizability and external validity (4 points)

Expected content:

- The population-register sample is a strength, but the final sample may differ from the adult Norwegian population because not everyone participated or provided valid device data.
- The response should consider age range, health, motivation, activity level and the Norwegian setting when identifying the populations to which the findings may reasonably apply.

Part C Confounding and causal interpretation (4 points)

Expected content:

- Confounders are factors that are associated with both physical activity and the outcome, such as age, sex, education, smoking, diet and health status.
- Addressing confounders may reduce measured confounding but does not remove residual or unmeasured confounding. Reverse causation is also possible because obesity or poor quality of life may reduce activity.

Part D Research ethics (4 points)

Expected content:

- Relevant issues include informed and voluntary consent, the right to withdraw, clear information about activity monitoring, and avoiding undue pressure to participate.
- Lifestyle and health information must be collected only when relevant and protected through secure storage, restricted access and appropriate handling of identifiers.
- The response may also consider participant burden, communication of potentially sensitive findings and responsible reporting that avoids stigma.

Use of AI-tools

The examiner's guide must provide guidance on how the examiner should respond if the student, in accordance with APA-7 in the chapter on AI-generated text, has stated that AI tools have generated parts of the content (i.e., assertions, statistics, arguments, ideas, artwork, coding, or similar). The following is standard text, which can be adjusted or replaced with subject-specific guidelines for the use of AI tools if these have been developed.

"According to APA-7 in the chapter on AI-generated text, students should briefly describe if and how they have used the tool. The examiner should assess the work presented in the exam submission/master's thesis, and the use of AI tools should not count either positively or negatively."

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Overall assessment

An excellent or very good response is characterised by:

- Clear links between the research questions, study design, measurements and chosen analyses.
- Correct selection of basic statistical analyses and clear explanation of the main assumptions.
- Appropriate descriptive reporting using central tendency and dispersion, frequencies or proportions, and effect estimates with confidence intervals as relevant.
- Critical discussion of measurement quality, selection, bias, confounding, generalizability and the limits of causal interpretation.
- Accurate, cautious interpretation expressed in the context of the study rather than as generic textbook statements.

Lower-level responses typically show unclear links between the question and the method, incorrect effect-measure interpretation, limited understanding of assumptions, or little critical application to the study described.

Total available score: 100 points.

Guiding template for content

-Overall criteria for assessment: Learning outcome descriptions and/or assessment criteria set for the individual exam (e.g. practical exam/oral exam, bachelor/master assignments and other major assignments).

-General grade descriptions for higher education (UHR 6 August 2004, rev. 2011), or a description of the requirements for a pass/fail grade (depending on the grade expression for the individual exam).

-Relevant syllabus for the examination paper. For specific questions, state the syllabus reference for the individual question.

-Expectations for answers. For exams with several specific questions, describe expectations for what gives full credit for each question, or what is expected for a passing grade. The question wording will determine how specific the assessor guidance can be. If scoring is used as an aid in the assessment, a rough description of how the points are distributed is provided.

-Use of academic discretion - holistic assessment should be specified, in relation to general grade expressions and/or assessment criteria for the exam in question.

-Other factors of importance for assessment (e.g. if assignments are to be weighted differently, if some parts of the syllabus are given less weight than other parts, plagiarism control, etc.).