

# Guidelines and Student Instructions for Course AP3132: Advanced Digital Image Processing

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## 1 Introduction

This course provides a student with knowledge, insight and understanding of modern aspects of advanced digital image processing techniques, including: Multi-Resolution Image Processing, Morphological Image Processing, Measurement of Image Features, Image Registration, Image Restoration, and Image Segmentation. Eventually, a student should be able to read, understand, summarize, implement, test, discuss and comment on scientific journal and conference papers in this field.

The examination requirements for the course AP3132 Advanced Image Processing are based on the content of lectures, selected material from two text books [1], [2], and an assignment. The lecture notes, course content, and a list of project descriptions can be found at the course's web pages on Brightspace (<https://brightspace.tudelft.nl>). The written exam assesses the student's knowledge, and understanding of all theory. We aim to test the general understanding of topics covered in this course.

The project assesses the student's ability to implement and employ an algorithm based on a description in a scientific journal and/or conference paper(s). It focuses on one topic covered by this course. The project is concluded by a written report, an oral presentation, and reviews/questions by a peer group and course instructors.

Each project will be done by a team of two students. The rules of engagement of the student projects are put forward in this document. This document also provides guidelines for preparing the final report, and the (oral) presentation.

### 1.1 Assignment

The student projects will be based on one or more papers from the international image processing literature. As part of the examination, each team has to write a short report, give an oral presentation, prepare a few written comments and/or written questions for two other student reports and answer questions about the course content.

The report and the presentation should not be just an abstract of the paper(s). It should provide insights into the presented work. Where it is possible it should relate to the text book(s) and lecture notes of this course.

The assignments will be graded based on:

- The clarity of the writing of the report
- The depth of argumentation of the report
- Quality of the performed experiments and critical reflection on the results
- Clarity of the presentation
- Quality of the questions to the other groups

As such, the report, presentation and the formulated questions as well as the answering of the questions, discussion after the presentation and the active role during the session will be part of the project assessment.

## 1.2 Practicalities

The presentations will be grouped in pre-scheduled sessions. Each presentation should not last more than 10 minutes (including a demo, if appropriate). Additionally, 5 minutes of time is reserved for questions related to the presentation.

A written report of **at most 10 pages A4** format according to the style file of **this** document should be made. Please note if, your report is longer than 10 pages we will not grade it, but send it back to you to shorten it.

The deadline for submission of the written report is **indicated in the announcement on Brightspace**. Please upload your pdf document under the Assignments tab in Brightspace. Only one student of the team needs to do this. Your report is automatically scanned for plagiarism at submission.

Each team has to read and evaluate two other reports from the same presentation session. For each report two questions or comments have to be formulated and mailed to the lecturers at least **one day before the presentation**. The questions should, of course, relate to the subject of the report. At the same time it is allowed to ask other questions that are indirectly related to the subject of the report. That means we assume that all students have a basic knowledge of all topics that are discussed during the lectures.

## 1.3 Report in LNCS format

The use of a standard uniform style sheet facilitates easy reading and an objective assessment of both the content and the length of the reports. We have adopted the layout and style sheet of the Springer Verlags' Lecture Notes on Computer Science for our all reports in our course". We strongly recommend using MS Word and this sample document while preparing your report.

## 1.4 Presentation in TU Delft style

To set a standard for the style of the presentations we adopted the TU Delft styles for MS Powerpoint. The appropriate template files can be downloaded from: <https://www.tudelft.nl/huisstijl/presentaties/>

## 2 Manuscript Preparation

This section describes the relevant formatting rules of Springer Verlag's Lecture Notes on Computer Science that we have adopted for this course.

We would like to stress that the styles in this document and the template file named `sv-lncs.dot` should not be manipulated and that the guidelines regarding font sizes and format should be adhered to. This is to ensure that the end product is as homogeneous as possible.

### 2.1 Printing Area

The printing area is 122 mm × 193 mm. The text should be justified to occupy the full line width, so that the right margin is not ragged, with words hyphenated as appropriate. Please fill pages so that the length of the text is no less than 180 mm.

### 2.2 Layout, Typeface, Font Sizes, and Numbering

Use 10-point type for the name(s) of the author(s) and 9-point type for the address(es). For the main text, please use 10-point type and single-line spacing. We recommend using Computer Modern Roman (CM) fonts, Times, or one of the similar typefaces widely used in photo-typesetting. (In these typefaces the letters have serifs, i.e., short endstrokes at the head and the foot of letters.) Italic type may be used *to emphasize* words in running text. Bold type and underlining should be avoided. With these sizes, the interline distance should be set so that some 45 lines occur on a full-text page.

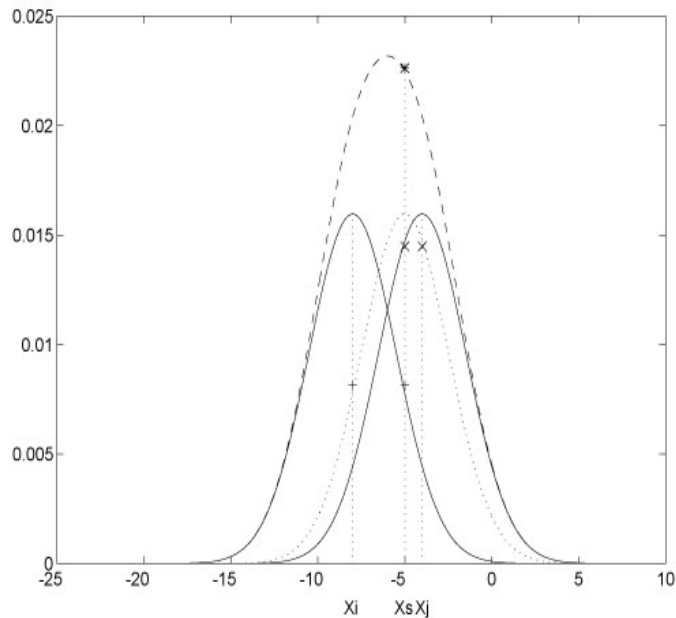
**Headings.** Headings should be capitalized (i.e., nouns, verbs, and all other words except articles, prepositions, and conjunctions should be set with an initial capital) and should, with the exception of the title, be aligned to the left. Words joined by a hyphen are subject to a special rule. If the first word can stand alone, the second word should be capitalized. The font sizes are given in Table 1.

Here are some examples of headings: "Criteria to Disprove Context-Freeness of Collage Languages", "On Correcting the Intrusion of Tracing Non-deterministic Programs by Software", "A User-Friendly and Extendable Data Distribution System", "Multi-flip Networks: Parallelizing GenSAT", "Self-determinations of Man".

**Table 1.** Font sizes of headings. Table captions should always be positioned *above* the tables. The final sentence of a table caption should end without a period

Heading level	Example	Font size and style
Title (centered)	<b>Lecture Notes ...</b>	14 point, bold
1 <sup>st</sup> -level heading	<b>1 Introduction</b>	12 point, bold
2 <sup>nd</sup> -level heading	<b>2.1 Printing Area</b>	10 point, bold
3 <sup>rd</sup> -level heading	<b>Headings.</b> Text follows ...	10 point, bold
4 <sup>th</sup> -level heading	<i>Remark.</i> Text follows ...	10 point, italic

**Lemmas, Propositions, and Theorems.** The numbers accorded to lemmas, propositions, and theorems etc. should appear in consecutive order, starting with the number 1, and not, for example, with the number 11.



**Fig. 1.** One kernel at  $x_s$  (*dotted kernel*) or two kernels at  $x_i$  and  $x_j$  (*left and right*) lead to the same summed estimate at  $x_s$ . This shows a figure consisting of different types of lines. Elements of the figure described in the caption should be set in italics, in parentheses, as shown in this sample caption. The last sentence of a figure caption should generally end without a period

### 2.3 Figures and Photographs

Please produce your figures electronically and integrate them into your text file.

Check that in line drawings, lines are not interrupted and have constant width. Grids and details within the figures must be clearly readable and may not be written one on top of the other. The lettering in figures should have a height of 2 mm (10-point type). Figures should be scaled up or down accordingly. Please do not use any absolute coordinates in figures.

If you cannot provide your figures electronically, paste the scanned originals into the manuscript and center them between the margins.

Figures should be numbered and should have a caption which should always be positioned *under* the figures, in contrast to the caption belonging to a table, which should always appear *above* the table. The final sentence of a caption, be it for a table or a figure, should end without a period. Please center the captions between the margins and set them in 9-point type (Fig. 1 shows an example). The distance between text and figure should be about 8 mm, the distance between figure and caption about 5 mm.

If you have to insert a pagebreak before a figure, please ensure that the previous page is completely filled.

*Remark 1.* In the printed reports, illustrations are generally black and white (halftones). Color pictures and color figures may appear unpredicted. Please assure that information put forward in figures and pictures can be grasped from a black and white print. Color pictures are welcome in the electronic version.

*Remark 2.* To ensure that the reproduction of your illustrations is of reasonable quality we advise against the use of shading. The contrast should be as pronounced as possible. This particularly applies for screenshots.

## 2.4 Formulas

Displayed equations or formulas are centered and set on a separate line (with an extra line or halfline space above and below). Displayed expressions should be numbered for reference. The numbers should be consecutive within each section or within the contribution, with numbers enclosed in parentheses and set on the right margin. For example,

$$x + y = z . \tag{1}$$

Please punctuate a displayed equation in the same way as ordinary text but with a small space before the end punctuation.

MS Word has a built-in equation editor that can be accessed through the menu: “Insert”, item: “Object ...”, and select: “Microsoft Equation”. This allows the creation of more complicated formulas, such as

$$G(u) = \int_{-\infty}^{+\infty} g(x)e^{-j2\pi ux} dx = \int_{-\infty}^{+\infty} g(x)[\cos(2\pi ux) - j \sin(2\pi ux)]dx . \tag{2}$$

Please note that variables are printed in *italics*, functions in roman, and numerals in roman.

## 2.5 Program Code

Program listings or program commands in the text are normally set in typewriter font, e.g., CMTT10 or Courier.

Example of a Computer Program from Jensen K., Wirth N. (1991) Pascal user manual and report. Springer, New York

```
program Inflation (Output)
  {Assuming annual inflation rates of 7%, 8%, and
  10%,... years};
  const  MaxYears = 10;
  var    Year: 0..MaxYears;
        Factor1, Factor2, Factor3: Real;
begin
  Year := 0;
  Factor1 := 1.0; Factor2 := 1.0; Factor3 := 1.0;
  WriteLn('Year 7% 8% 10%'); WriteLn;
  repeat
    Year := Year + 1;
    Factor1 := Factor1 * 1.07;
    Factor2 := Factor2 * 1.08;
    Factor3 := Factor3 * 1.10;
    WriteLn (Year:5, Factor1:7:3, Factor2:7:3,
             Factor3:7:3)
  until Year = MaxYears
end.
```

## 2.6 Footnotes

The use of footnotes should be avoided.

## 2.7 Citations

The list of references is headed “References” and is not assigned a number in the decimal system of headings. The list should be set in small print and placed at the end of your contribution. Please do not insert a pagebreak before the list of references if the page is not completely filled. An example is given at the end of this information sheet. For citations in the text please use square brackets and consecutive numbers: [1], [2], ...

## 2.8 Page Numbering and Running Heads

Your paper should show printed page numbers at the bottom of each page. Do not set running heads.

## 2.9 Printing and Page Setup

We prefer the text to be centered on the pages (i.e., equal margins left and right and top and bottom). The format of the paper is A4.

## 6 Checklist

Use this checklist in preparation to fulfill the examination requirements.

- perform a student project that you have selected yourself
- prepare a written report for the student project using the LNCS styles as described in this document. **Do not use more than 10 pages** of text, formulas, images, including everything (and don't mess with the prescribed fontsize!).
- submit an electronic version of your manuscript by e-mail to the course lecturers and to the two prescribed peer groups. The exact date is indicated in the announcement of the assignments on Brightspace.
- prepare a presentation in MS Powerpoint using the TU Delft style. Your presentation should be approximately 8 sheets including the title and conclusions and should be focused on the essentials.
- present your work (in teams of two students) in maximal 10 minutes.
- hand in your written comments and/or questions regarding two other student projects (that you will receive four days before the examination date) on the day before the presentation session.

## References

1. R.C. Gonzalez, R.E. Woods, Digital Image Processing, 2<sup>nd</sup> edition, Prentice Hall, (2002).
2. R. Szeliski, Computer Vision: Algorithms and Applications, Springer, (2011).

## Appendix

Appendices should not be included.