

# Engineers and information literacy: an oxymoron or a need? Academic and information literacy for future engineers

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# **Engineers and information literacy: an oxymoron or a need?**

## **Academic and information literacy for future engineers**

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**Bojan Macan**

Library, Ruđer Bošković Institute, Zagreb, Croatia



# Agenda

- Engineering study background
- Research, Publications and Responsibility in Science
  - Syllabus outline
- New examination model
- Future plans

# Engineering study background

- Recommended master programme at Faculty of Electrical Engineering and Computing (FER)
  - Duration of each Master program at FER is 2 years

Courses	ECTS	%
Theoretical courses (T)	25	21%
Specialization courses (S)	20	17%
Elective courses, Seminar and Project (I)	23	19%
Mathematics and science courses (M)	8	7%
<b>Humanistic or social courses (D)</b>	<b>6</b>	<b>5%</b>
Laboratories profile (L)	8	7%
Master Thesis (Z)	30	25%
	120	



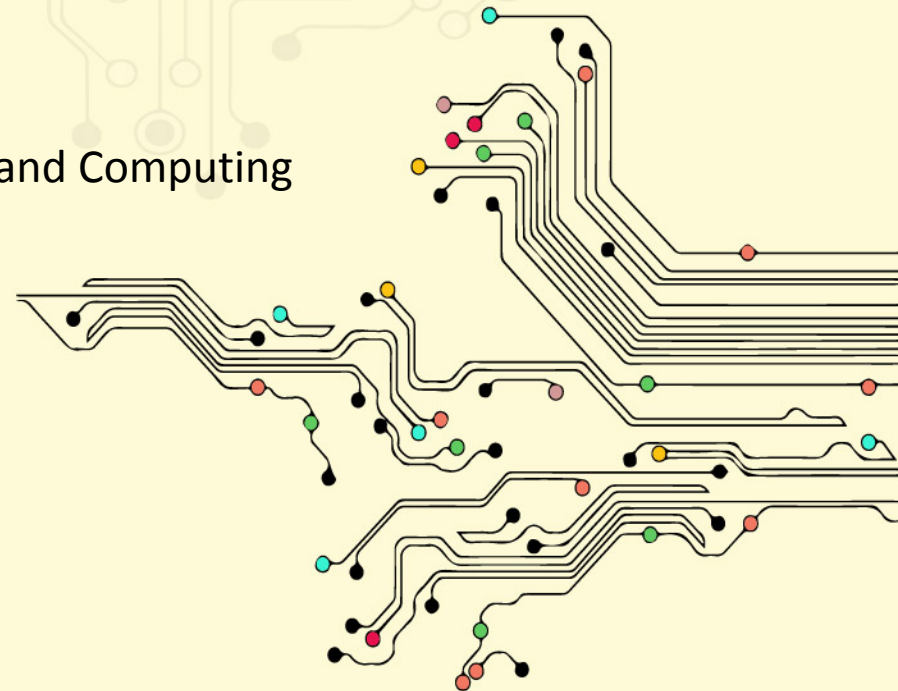
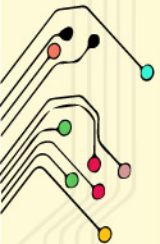
# Research, Publications and Responsibility in Science



- Started in Academic Year 1998/1999 under name: *Methodology and presentation of research results*
- Renamed into *Research, Publications and Responsibility in Science* Academic Year 2003/2004
- Stand-alone credit course (2 ECTS) – 15 weeks, Summer semester
- Grading system (1-5)
- Forms of teaching
  - Lectures with discussions
- Assessment measures
  - Continuous assessment
    - Homework
    - Quizzes
    - Participation in class
    - Student survey
  - Exam

## • Teaching staff :

- Head of the Central Medical Library, School of Medicine, University of Zagreb
- Head of the Department of Medical Informatics of University of Rijeka
- Head of the Technology Transfer Office at Centre for Research, Development and Technology Transfer at University of Zagreb
- Head of the Library, Institute Ruđer Bošković
- Research assistant at the Institute for Social Research in Zagreb
- Librarian at the Central Medical Library, School of Medicine, University of Zagreb
- ✓ Guest scientist from  
the Faculty of Electrical Engineering and Computing



# Syllabus outline

Week	Title lectures	Continous assessment
1.	Science and scientific research	Student survey
2.	Methodologies and types of scientific research	
3.	Responsible conduct of research	
4.	Data collecting and analysis	
5.	Publishing results	
6.	Critical appraisal of article	
7.	Evaluation of scientific work	
8.	Mid term exam: written (multiple choice test)	
9.	Literature search	Quizz – Group 1
10.	Reference managers	Quizz – Group 2
11.	Intellectual property in the research, development, innovation and technology 1	Quizz – Group 3
12.	Intellectual property in the research, development, innovation and technology 2	Participation in class Via Moodle
13.	Web and research	
14.	Talk with a scientist	
15.	Final exam: written (multiple choice test)	Student survey

**Homework**

# Objectives and learning outcomes

Identify basic principles of scientific thinking and research

Explain the structure of a scientific paper

Describe the process of publishing of a scientific paper

Searching of information sources

Critical evaluation of information sources

Identify basic principles of responsible conduct of research

Describe the procedure for granting patents



- ZBORNIK PREDMETA
- Istraživanja, publikacije i odgovornost u znanosti
- GLAVNI IZBORNIK
- Naslovnica
  - O FER-u
  - Ustroj ustanove
  - Znanstveni i stručni rad
  - Upis na FER
  - Preddiplomski studij
  - Diplomski studij
  - Poslijediplomski studij
  - Međunarodne razmjene
  - Cjelovito učenje i struka
  - Život na FER-u
  - O Webu

ISTRAŽIVANJA, PUBLIKACIJE I ODGOVORNOST U ZNANOSTI

Osnovni podaci | Detaljne informacije | Nastava

Šifra: 46418  
ECTS: 2

Nositelji: Prof. dr. sc. Jelka Petrak

Prijava ispita: Studomat

Engleski jezik: Nastavnik nije u mogućnosti ponuditi nastavu na engleskom jeziku.

- REPOZITORIJI
- Domaće zadaće (2)
    - Upute za izradu domaćih zadaća [510,24 KIB]
    - Predložak rada (DZ IPOUZ) [32,57 KIB]
  - Informacije o predmetu (1)
    - Informacije o predmetu [289,09 KIB]
  - Predavanja (9)
    - Vrednovanje znanstvenog rada [372,65 KIB]
    - Upravljanje referencama [781,38 KIB]

OBAVIJEŠTI

Kratka provjera znanja 09.05.2013. u 09:39



Istraživanja, publikacije i odgovornost u znanosti

Termini ovise u rasporedu

- Termin 1: 15. svibnja
- Termin 2: 22. svibnja
- Termin 3: 29. svibnja

Međuispit



Prikupljanje i obrada pod

Podsjećamo vas na održa i obradu podataka profesor

Dodite u što većem broju!

DATA: BY THE NUN

NUMBER OF YEARS TO GET DATA: 3

- Moja naslovica
- Navigacija
- Moja naslovica
  - Naslovna sustava
  - Stranice na razini sustava
  - Moj profil
  - Trenutni kolegij
    - IPOUZ
      - Sustoni
      - Izveštaji
      - Općenito
      - Znanost i znanstveno istraživanje
      - Metodologija i vrste znanstvenog istraživanja
      - Odgovorna provedba istraživanja
      - Prikupljanje i obrada podataka
      - Objavljivanje rezultata istraživanja
      - Pretraživanje znanstvene literature
      - Kritička ocjena znanstvenog članka
      - Međuispit
      - Vrednovanje znanstvenog rada
      - Upravljanje referencama
      - ... pitanja, FREKVOU inovacija i transferu tehnologije 1
      - ... pitanja, razvojno inovacija i transferu tehnologije 2
      - Znanost i web
      - Razgovor sa znanstvenikom i Maria Cifrek
    - Moji kolegiji
- Postavke
- Administracija kolegija
  - Omogućiti izmjenu
  - Uredi postavke
  - Korisnici
  - Filteri
  - Ocjene
  - Backup
  - Vraćanje kolegija
  - Uvoz
  - Reset
  - Resetiranje

Novo forum

Znanost i znanstveno istraživanje

Metodologija i vrste znanstvenog istraživanja

Odgovorna provedba istraživanja

Prikupljanje i obrada podataka

Objavljivanje rezultata istraživanja

Pretraživanje znanstvene literature

Kritička ocjena znanstvenog članka

Međuispit

Vrednovanje znanstvenog rada

Upravljanje referencama

Intelektualno vlasništvo u istraživanju, razvoju inovacija i transferu tehnologije 1

Intelektualno vlasništvo u istraživanju, razvoju inovacija i transferu tehnologije 2

Znanost i web

Razgovor sa znanstvenikom : Mario Cifrek

Pretraži forume

Novo obavijesti

Dodajte novu temu...

Trebam pomoć oko DZ

Pitanja i komentari

Proble teme ...

Official course site:

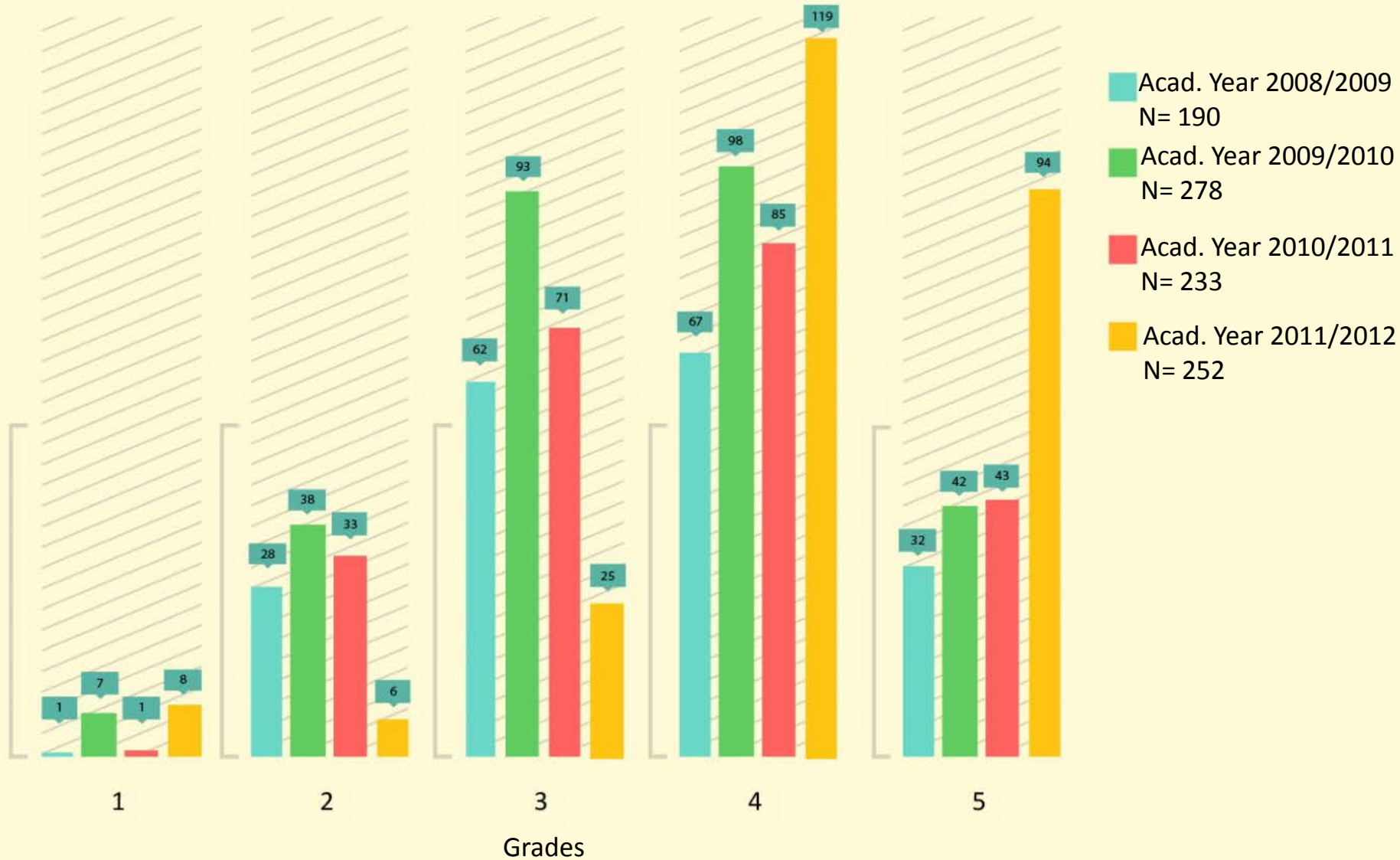
- News
- Communication (forum, comments)
- Resources

Moodle course site:

- Student survey
- Quizzes
- Resources
- Distance learning

# Students' grades in the 2008-2012 period

Number of students





# New examination model

- Academic Year 2011/2012
- First attempt: **submitting** a scientific paper
- Two part homework
  - 1st part (HW1): finding answer to assigned task by searching different bibliographic databases and FER library catalog
  - 2nd part (HW2): submitting results of the HW1 to the fictional „Library & Information Science Journal” using the **Open Journal Systems**:
    - Register as an author
    - Write a covering letter to the editor
    - Upload & send

# Results

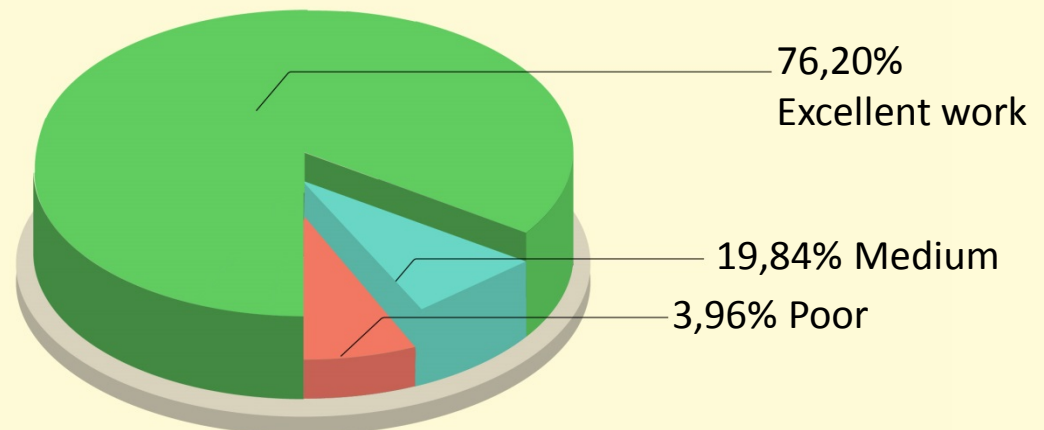
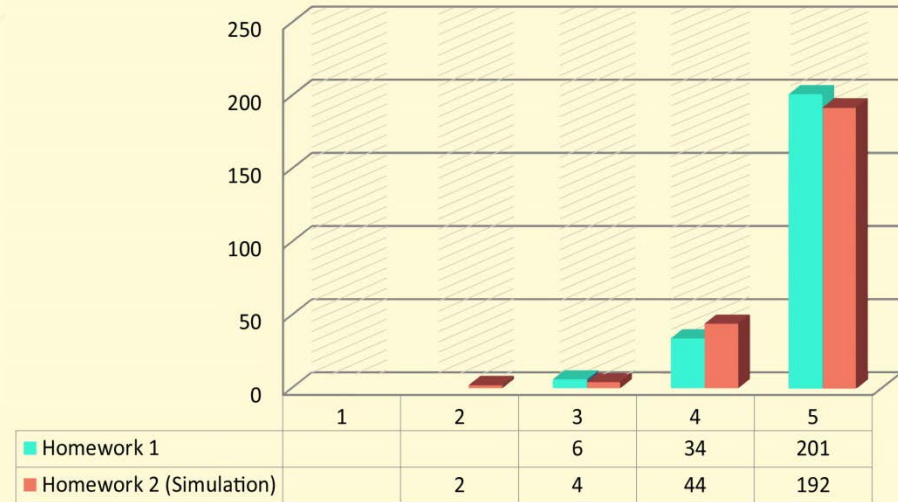
- Number of students = 252

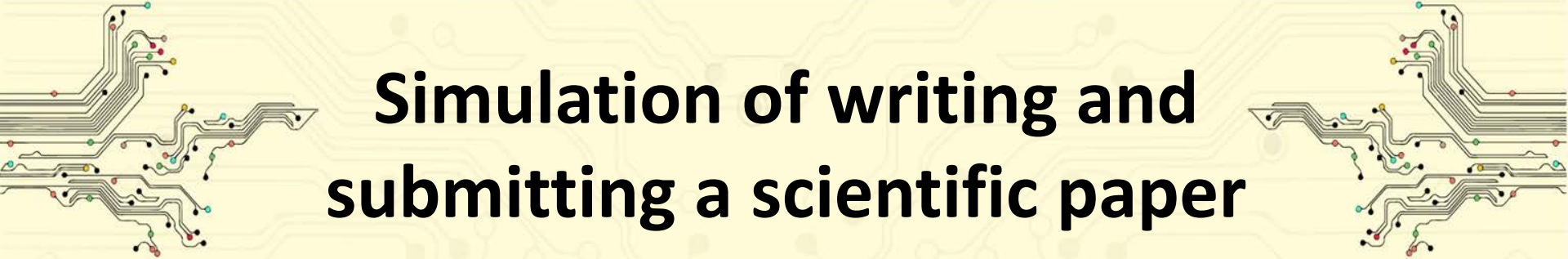
- 242 fulfilled homework
- Grading: 1-5 points

- Weakest segments:

- Covering letter to the editor:
  - No letter at all
  - Improper expressions
    - What's up, my homework is..."
- Forgot to upload homework

HW1 and HW2





# Simulation of writing and submitting a scientific paper

- Academic Year 2012/2013
- Homework (individual)
- Time to fulfill: 6 weeks
- Language: Croatian
- Objective: apply all lessons learned
- Homework topic is not pre-defined
  - Students can use **their** old seminar papers, articles, project materials,...

- Created custom template of a scientific paper
  - Based on [IEEE Transactions and Journals](#)

Explained in detail parts of the article template



> REPLACE THIS LINE WITH YOUR PAPER IDENTIFICATION NUMBER (DOUBLE-CLICK HERE TO EDIT) < 1

Library & Information Science Journal, Volume 1 (2013)

## Preparation of Papers for IEEE TRANSACTIONS and JOURNALS (November 2012)

First A. Author, *Fellow, IEEE*, Second B. Author, and Third C. Author, Jr., *Member, IEEE*

**Abstract**—These instructions give you guidelines for preparing papers for IEEE Transactions and Journals. Use this document as a template if you are using Microsoft *Word* 6.0 or later. Otherwise, use this document as an instruction set. The electronic file of your paper will be formatted further at IEEE. Paper titles should be written in uppercase and lowercase letters, not all uppercase. Avoid writing long formulas with subscripts in the title; short formulas that identify the elements are fine (e.g., “Nd-Fe-B”). Do not write “(Invited)” in the title. Full names of authors are preferred in the author field, but are not required. Put a space between authors’ initials. Define all symbols used in the abstract. Do not cite references in the abstract. Do not delete the blank line immediately above the abstract; it sets the footnote at the bottom of this column.

**Index Terms**—Enter key words or phrases in alphabetical order, separated by commas. For a list of suggested keywords, send a blank e-mail to [keywords@ieee.org](mailto:keywords@ieee.org) or visit [http://www.ieee.org/organizations/pubs/ani\\_prod/keyword98.txt](http://www.ieee.org/organizations/pubs/ani_prod/keyword98.txt)

### I. INTRODUCTION

THIS document is a template for Microsoft *Word* versions 6.0 or later. If you are reading a paper or PDF version of this document, please download the electronic file, TRANS-JOUR.DOC, from the IEEE Web site at <http://www.ieee.org/web/publications/authors/transjnl/index.html> so you can use it to prepare your manuscript. If you would prefer to use LATEX, download IEEE’s LATEX style and sample files from the same Web page. Use these LATEX files for formatting, but please follow the instructions in TRANS-JOUR.DOC or TRANS-JOUR.PDF.

If your paper is intended for a conference, please contact your conference editor concerning acceptable word processor formats for your particular conference.

### II. GUIDELINES FOR MANUSCRIPT PREPARATION

When you open TRANS-JOUR.DOC, select “Page Layout” from the “View” menu in the menu bar (View | Page Layout), (these instructions assume MS 6.0. Some versions may have alternate ways to access the same functionalities noted here). Then, type over sections of TRANS-JOUR.DOC or cut and paste from another document and use markup styles. The pull-down style menu is at the left of the Formatting Toolbar at the top of your *Word* window (for example, the style at this point in the document is “Text”). Highlight a section that you want to designate with a certain style, then select the appropriate name on the style menu. The style will adjust your fonts and line spacing. Do not change the font sizes or line spacing to squeeze more text into a limited number of pages. Use italics for emphasis; do not underline.

To insert images in *Word*, position the cursor at the insertion point and either use Insert | Picture | From File or copy the image to the Windows clipboard and then Edit | Paste Special | Picture (with “float over text” unchecked).

IEEE will do the final formatting of your paper. If your paper is intended for a conference, please observe the conference page limits.

#### A. Abbreviations and Acronyms

Define abbreviations and acronyms the first time they are used in the text, even after they have already been defined in the abstract. Abbreviations such as IEEE, SI, ac, and dc do not have to be defined. Abbreviations that incorporate periods should not have spaces: write “C.N.R.S.,” not “C. N. R. S.” Do not use abbreviations in the title unless they are unavoidable (for example, “IEEE” in the title of this article).

#### B. Other Recommendations

Use one space after periods and colons. Hyphenate complex

## Naslov članka

Ime Prezime, *Ustanova*, JMBAG :

**Sažetak**—Sažetak upućuje na sažeti prikaz članka ili djela, nema obilježja i namjenu zaključka. U sažetku se iznosi pregled, odnosno vrlo kratak sadržaj cjelokupno izložene tematike. Njegova namjena je dvostruka: mora poslužiti javnosti kao informacija o nekom djelu i omogućiti čitateljima da brzo spoznaju bitna obilježja nekog djela i na taj način ustanove je li za njih djelo zanimljivo i da li će ga pročitati. Ne sadrži reference, tablice, slike i skraćenice.

**Ključne riječi**—Riječi ili fraze koje odražavaju sadržaj i postupak opisan u radu. Uvrštavaju se abecednim redom i odvajaju se zarezom. Popis predloženih riječi možete pregledati na: [http://www.ieee.org/organizations/pubs/ani\\_prod/keyword98.txt](http://www.ieee.org/organizations/pubs/ani_prod/keyword98.txt).

### I. UVOD

Uvod kao početni i pristupni dio rada trebao bi predstavljati prvi dio znanstvenog rada. Kod pisanja uvoda treba u cijelosti doći do izražaja autorova inventivnost, a na njemu je da izabere najadekvatnije načine na koje će prići temi i zainteresirati čitatelja za nju.

Važno je u uvodu: 1) precizirati predmet rada (o čemu se u radu piše, odnosno problem ili probleme koji će se obrađivati), 2) definirati pojmove (sadržane u naslovu ili navesti druge podatke) – naznačiti je li rad teorijske, praktične ili eksperimentalne prirode, 3) dati (povijesni) pregled istraživanja (literature) koja su prethodila radu, teorijsku podlogu rada, odnosno kritički osvrt na postojeću literaturu (izvori informacija i spoznaja o temi koja se istražuje) kako bi se ustvrdilo stanje i doseg znanosti u istraživačkom području, 4) objašnjenje kako je istraživač došao do teme i pitanja koja razmatra, 5) dati okvir istraživanja koje se provodi.

znanstvenih metoda kojima se istražuju i otkrivaju znanstvene spoznaje jesu: 1) objektivnost, 2) pouzdanost, 3) preciznost, 4) sustavnost i 5) općenitost.

Preporučeni opseg je 10-15%.

### III. REZULTATI

Rezultati su dio rada u kojem autor navodi rezultate koje je dobio, odnosno ono do čega je istraživanjem došao. Oni se mogu prezentirati riječima ili grafički. Moraju biti jasno naznačena kretanja, razlike i rezultati statističkih testova ako su korišteni. Taj dio rada obično nije dug iako je vrlo važan jer on je srž onoga što je novo ili važno u radu. Rezultati ili dobiveni pokazatelji analiziraju se s obzirom na postavljenu hipotezu/hipoteze i pitanja koja su navedena u uvodu. Znanstvenika odlikuje poštenje i istinoljubivost pa nepristrano navodi i rezultate i primjere koji idu, kao i one koji ne idu u prilog hipotezi koju je postavio [1].

Preporučeni opseg 10-15% rada.

### IV. RASPRAVA

Dio je članka u kojem autor komentira, interpretira i procjenjuje dobivene rezultate i odnose među njima, odnosno objašnjava što oni znače u odnosu prema postavljenoj hipotezi i relevantnoj literaturi. Tu se uspoređuju rezultati istraživanja provedenih za potrebe rada s eventualnim rezultatima dobivenim u sličnim ispitivanjima, ali i primjenom drugih metoda te koliko se slažu ili mijenjaju prijašnje spoznaje o ispitivanom problemu [1].

Preporučeni opseg 20% rada.

### V. ZAKLJUČAK

Original

Modified and translated



## Assignment description:



- Use template for technical guidelines
- Maximum of 4 pages
- Language and style of writing
- Proper citing of relevant sources
- At least 5 references
- Follow instructions for authors
- Respect principles of academic integrity and responsibility
  - In case of plagiarism all points will be deducted
- Submit article to the „Library & Information Science Journal”



## Library & Information Science Journal

### Step 1. Starting the Submission

1. **START** 2. UPLOAD SUBMISSION 3. ENTER METADATA 4. UPLOAD SUPPLEMENTARY FILES 5. CONFIRMATION

Encountering difficulties? Contact [Hrcak](#) for assistance.

### Submission Checklist

Indicate that this submission is ready to be considered by this journal by checking off the following (comments to the editor can be added below).

- The submission has not been previously published, nor is it before another journal for consideration (or an explanation has been provided in Comments to the Editor).
- The submission file is in Microsoft Word, RTF, or WordPerfect document file format.
- Where available, URLs for the references have been provided.
- The text is single-spaced; uses a 12-point font; employs italics, rather than underlining (except with URL addresses); and all illustrations, figures, and tables are placed at the end of the text, rather than in the middle of a paragraph.
- The text adheres to the stylistic and bibliographic requirements outlined in the [Author Guidelines](#), which is found in About the Journal.
- If submitting to a peer-reviewed section of the journal, the instructions in [Ensuring a Blind Review](#) have been followed.

### Journal's Privacy Statement

The names and email addresses entered in this journal site will be used exclusively for the stated purposes of this journal and will not be made available for any other purpose.

### Comments for the Editor

Enter text (optional)

\* Denotes required field

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To upload a manuscript to this journal, complete the following steps.

1. On this page, click Browse (or Choose File) which opens a Choose File window for locating the file on the hard drive of your computer.
2. Locate the file you wish to submit and highlight it.
3. Click Open on the Choose File window, which places the name of the file on this page.
4. Click Upload on this page, which uploads the file from the computer to the journal's web site and renames it following the journal's conventions.
5. Once the submission is uploaded, click Save and Continue at the bottom of this page.

Encountering difficulties? Contact [Hrcak](#) for assistance.

### Submission File

No submission file uploaded.

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### Step 3. Entering the Submission's Metadata

1. **START** 2. **UPLOAD SUBMISSION** 3. **ENTER METADATA** 4. **UPLOAD SUPPLEMENTARY FILES** 5. **CONFIRMATION**

#### Authors

First name\*   
Middle name\*   
Last name\*   
Email\*   
URL   
Affiliation   
(Your institution, e.g. "Simon Fraser University")  
Country   
Bio statement (E.g., department and rank)

#### Title and Abstract

Title\*   
Abstract\*

#### Indexing

Language   
English=en; French=fr; Spanish=es. [Additional codes.](#)

#### Supporting Agencies

Identify agencies that provided funding or support for the work presented in this submission.

Agencies

\* Denotes required field

### Step 5. Confirming the Submission

1. **START** 2. **UPLOAD SUBMISSION** 3. **ENTER METADATA** 4. **UPLOAD SUPPLEMENTARY FILES** 5. **CONFIRMATION**

To submit your manuscript to Library & Information Science Journal click Finish Submission. The submission's principal contact will receive an acknowledgement by email and will progress through the editorial process by logging in to the journal web site. Thank you for your interest in publishing with Library & Information Science Journal.

#### File Summary

ID	ORIGINAL FILE NAME	TYPE	FILE SIZE
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No files have been attached to this submission.

### Step 4. Uploading Supplementary Files

1. **START** 2. **UPLOAD SUBMISSION** 3. **ENTER METADATA** 4. **UPLOAD SUPPLEMENTARY FILES** 5. **CONFIRMATION**

This optional step allows Supplementary Files to be added to a submission. The files, which can be in any format, might include (a) research instruments, (b) data sets, which can be research ethics review, (c) sources that otherwise would be unavailable to readers, (d) figures and tables that cannot be integrated into the text itself, or other materials that add value to the research.

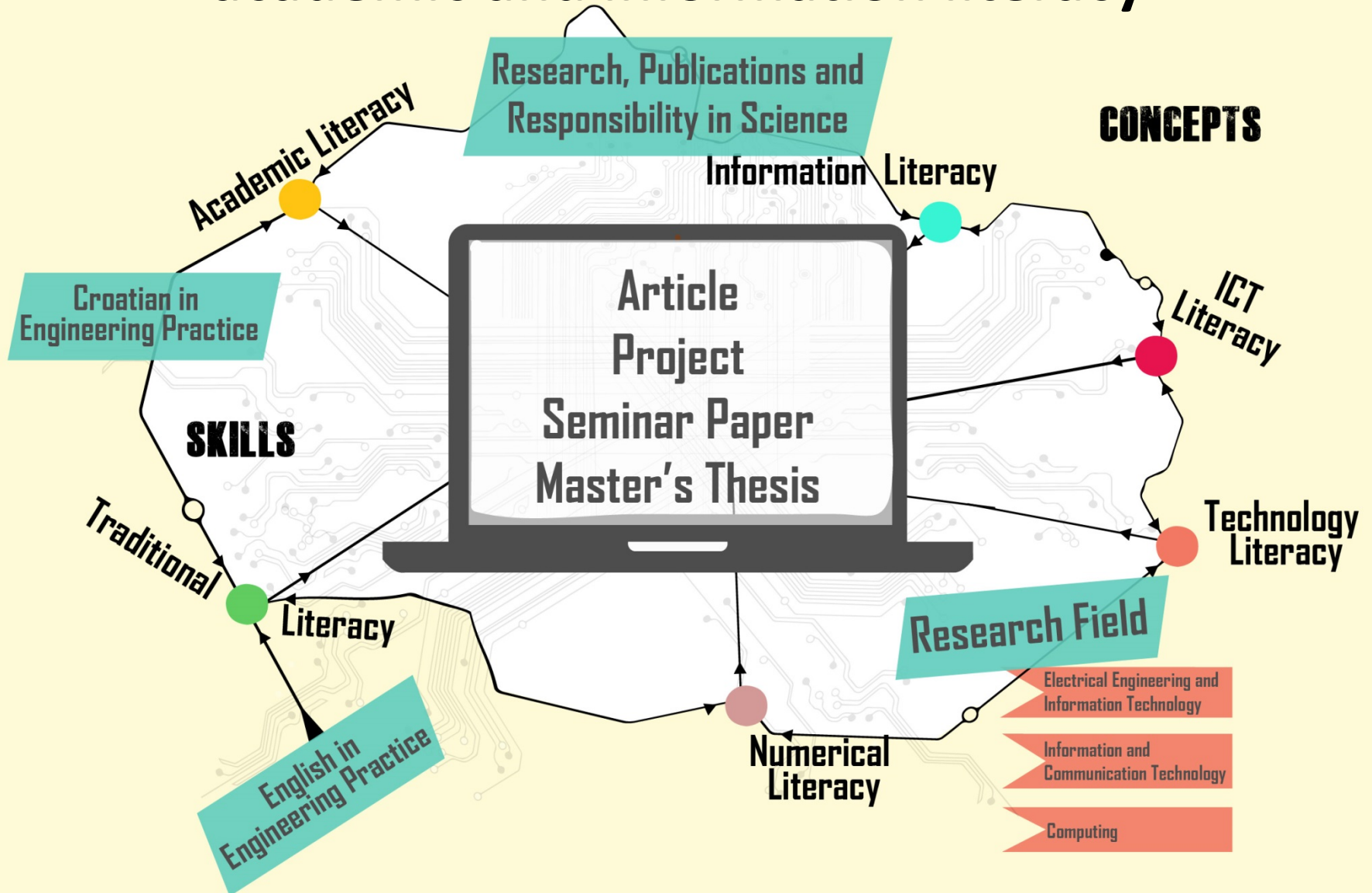
ID	TITLE	ORIGINAL FILE NAME	DATE UPLOADED
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No supplementary files have been added to this submission.

Upload supplementary file  No file chosen

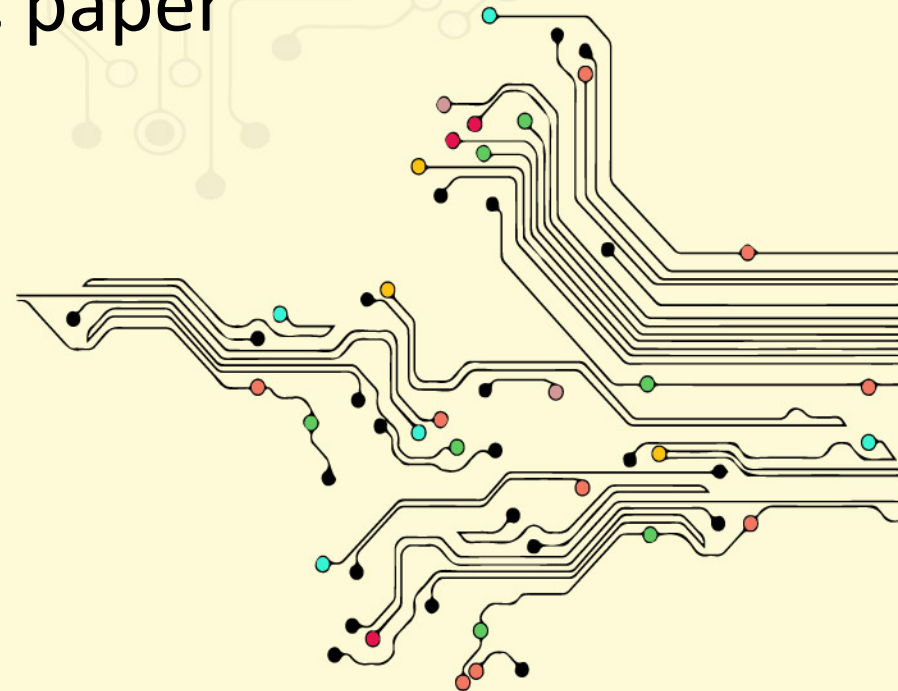
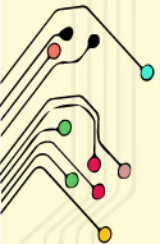


# Long-term model for teaching academic and information literacy



# Future plans...

...continue with the simulation of writing and submitting a scientific paper



Thank you!  
Questions?

