Software Engineering Education Knowledge versus Industrial Needs—Validation Survey

This is a survey aiming to determine the extent to which software practitioners agree with the findings of the study titled "Software Engineering Education Knowledge versus Industrial Needs". The work investigates the relevance of the Software Engineering Education Knowledge (SEEK) of the latest IEEE/ACM Curriculum Guidelines for Undergraduate Degree Programs in Software Engineering (SE2014) to industrial needs, by exploring topics that practitioners discuss in online programmer communities, namely, Stack Overflow.

The paper has been submitted to IEEE Transactions on Education and is currently under revision. The abstract can be found here: https://zenodo.org/record/4251041.

The time required to complete this questionnaire is about 20 minutes.

* Required

Use of Stack Overflow

1. Have you ever used Stack Overflow? *

   Mark only one oval.

   ◯ Yes

   ◯ No   *Skip to question 8*

Use of Stack Overflow

2. How often do you use Stack Overflow for each of the following reasons? *

Mark only one oval per row.

	Never	Rarely	Sometimes	Frequently
Best implementation practices	○	○	○	○
Explain or have a software engineering component explained (e.g. data structures, programming languages, frameworks, testing techniques)	○	○	○	○
Code review	○	○	○	○
Debugging assistance	○	○	○	○
Learning material recommendations	○	○	○	○
Assistance in specific exercises and problems	○	○	○	○
Mathematical concepts explanations	○	○	○	○
Software lifecycle topics besides Software Construction (e.g. Software Requirements, Software Processes, Software Quality)	○	○	○	○

3. Are there any other reasons you use Stack Overflow? Please specify them.

_____

_____

_____

_____

_____

4. In your opinion, is Stack Overflow only used for technical issues? *

With the term "technical issues" we refer to issues that mainly involve coding and practical programming skills (e.g., to resolve a bug), and less so theoretical knowledge (e.g., to explain a software design pattern).

Mark only one oval.

⬭ Yes

⬭ No

Activity on Stack Overflow

5. Do you interact (i.e., create, answer, vote) with Stack Overflow posts? *

Mark only one oval.

⬭ Yes

⬭ No   *Skip to question 8*

6. In either case, why would you cite a Wikipedia article in a Stack Overflow post? *

_____

_____

_____

_____

_____

Activity on Stack Overflow

7. Have you ever pointed to Wikipedia articles from your Stack Overflow posts?

Mark only one oval.

⬭ Yes

⬭ No

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Below you will find the software engineering knowledge areas and units* included in the Software Engineering Education Knowledge (SEEK) of the latest IEEE/ACM Curriculum Guidelines for Undergraduate Degree Programs in Software Engineering (SE2014). The recommended lecture hours for each knowledge area and unit are also displayed.

Further details about each knowledge unit can be found in the following document:
https://docs.google.com/document/d/1EnEGkdNA190LugEhJWtjDtmcUsdz41InSAPT7hZOphw/edit?usp=sharing

* Each knowledge area includes a set of knowledge units.

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Assessment of the SE2014 SEEK

SEEK Recommended Course Curriculum

KA/KU	Title	Hours		KA/KU	Title	Hours
CMP	**Computing essentials**	**152**		**DES**	**Software design**	**48**
CMP.cf	Computer science foundations	120		DES.con	Design concepts	3
CMP.ct	Construction technologies	20		DES.str	Design strategies	6
CMP.tl	Construction tools	12		DES.ar	Architectural design	12
				DES.hci	Human-computer interaction design	10
				DES.dd	Detailed design	14
				DES.ev	Design evaluation	3
FND	**Mathematical and engineering fundamentals**	**80**		**VAV**	**Software verification and validation**	**37**
FND.mf	Mathematical foundations	50		VAV.fnd	V&V terminology and foundations	5
FND.ef	Engineering foundations for software	22		VAV.rev	Reviews and static analysis	9
FND.ec	Engineering economics for software	8		VAV.tst	Testing	18
				VAV.par	Problem analysis and reporting	5
PRF	**Professional practice**	**29**		**PRO**	**Software process**	**33**
PRF.psy	Group dynamics and psychology	8		PRO.con	Process concepts	3
PRF.com	Communications skills (specific to SE)	15		PRO.imp	Process implementation	8
PRF.pr	Professionalism	6		PRO.pp	Project planning and tracking	8
				PRO.cm	Software configuration management	6
				PRO.evo	Evolution processes and activities	8
MAA	**Software modeling and analysis**	**28**		**QUA**	**Software quality**	**10**
MAA.md	Modeling foundations	8		QUA.cc	Software quality concepts and culture	2
MAA.tm	Types of models	12		QUA.pca	Process assurance	4
MAA.af	Analysis fundamentals	8		QUA.pda	Product assurance	4
REQ	**Requirements analysis and specification**	**30**		**SEC**	**Security**	**20**
REQ.rfd	Requirements fundamentals	6		SEC.sfd	Security fundamentals	4
REQ.er	Eliciting requirements	10		SEC.net	Computer and network security	8
REQ.rsd	Requirements specification and documentation	10		SEC.dev	Developing secure software	8
REQ.rv	Requirements validation	4				

8. How important are the SEEK knowledge units for an undergraduate software engineering curriculum? *

Mark only one oval per row.

	Not At All	Slightly	Significantly	Extremely
Computer Science Foundations (120 hours)	○	○	○	○
Construction Technologies (20 hours)	○	○	○	○
Construction Tools (12 hours)	○	○	○	○
Mathematical Foundations (50 hours)	○	○	○	○
Engineering Foundations for Software (22 hours)	○	○	○	○
Engineering Economics for Software (8 hours)	○	○	○	○
Group Dynamics Psychology (8 hours)	○	○	○	○
Communication Skills (15 hours)	○	○	○	○
Professionalism (6 hours)	○	○	○	○
Modelling Foundations (8 hours)	○	○	○	○
Types of Models (12 hours)	○	○	○	○
Analysis Fundamentals (8 hours)	○	○	○	○
Requirements Fundamentals (6 hours)	○	○	○	○
Eliciting Requirements (10 hours)	○	○	○	○
Requirements Specification and Documentation (10 hours)	○	○	○	○
Requirements Validation (4 hours)	○	○	○	○
Design Concepts (3 hours)	○	○	○	○
Design Strategies (6 hours)	○	○	○	○
Architectural Design (12 hours)	○	○	○	○
	○	○	○	○

Human-Computer Interaction Design (10 hours)	⬭	⬭	⬭	⬭
Detailed Design (14 hours)	⬭	⬭	⬭	⬭
Design Evaluation (3 hours)	⬭	⬭	⬭	⬭
Verification & Validation Terminology and Foundations (5 hours)	⬭	⬭	⬭	⬭
Reviews and Static Analysis (9 hours)	⬭	⬭	⬭	⬭
Testing (18 hours)	⬭	⬭	⬭	⬭
Problem Analysis and Reporting (5 hours)	⬭	⬭	⬭	⬭
Process Concepts (3 hours)	⬭	⬭	⬭	⬭
Process Implementation (8 hours)	⬭	⬭	⬭	⬭
Project Planning and Tracking (8 hours)	⬭	⬭	⬭	⬭
Software Configuration Management (6 hours)	⬭	⬭	⬭	⬭
Evolution Process and Activities (8 hours)	⬭	⬭	⬭	⬭
Software Quality Concepts Culture (2 hours)	⬭	⬭	⬭	⬭
Process Assurance (4 hours)	⬭	⬭	⬭	⬭
Product Assurance (4 hours)	⬭	⬭	⬭	⬭
Security Fundamentals (4 hours)	⬭	⬭	⬭	⬭
Computer and Network Security (8 hours)	⬭	⬭	⬭	⬭
Developing Secure Software (8 hours)	⬭	⬭	⬭	⬭

Assessment of the SE2014 SEEK

Below you will find the software engineering knowledge areas and units* included in the Software Engineering Education Knowledge (SEEK) of the latest IEEE/ACM Curriculum Guidelines for Undergraduate Degree Programs in Software Engineering (SE2014). The recommended lecture hours for each knowledge area and unit are also displayed.

Further details about each knowledge unit can be found in the following document:
https://docs.google.com/document/d/1EnEGkdNA190LugEhJWtjDtmcUsdz41InSAPT7hZOphw/edit?usp=sharing

* Each knowledge area includes a set of knowledge units.

SEEK Recommended Course Curriculum

KA/KU	Title	Hours	KA/KU	Title	Hours
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REQ.rv	Requirements validation	4			

9. How do you assess the recommended lecture hours of the SEEK knowledge units? *

Mark only one oval per row.

	The unit should be excluded	Less hours should be assigned	Enough hours are assigned	More hours should be assigned
Computer Science Foundations (120 hours)	○	○	○	○
Construction Technologies (20 hours)	○	○	○	○
Construction Tools (12 hours)	○	○	○	○
Mathematical Foundations (50 hours)	○	○	○	○
Engineering Foundations for Software (22 hours)	○	○	○	○
Engineering Economics for Software (8 hours)	○	○	○	○
Group Dynamics Psychology (8 hours)	○	○	○	○
Communication Skills (15 hours)	○	○	○	○
Professionalism (6 hours)	○	○	○	○
Modelling Foundations (8 hours)	○	○	○	○
Types of Models (12 hours)	○	○	○	○
Analysis Fundamentals (8 hours)	○	○	○	○
	○	○	○	○

Requirements Fundamentals (6 hours)				
Eliciting Requirements (10 hours)	⬭	⬭	⬭	⬭
Requirements Specification and Documentation (10 hours)	⬭	⬭	⬭	⬭
Requirements Validation (4 hours)	⬭	⬭	⬭	⬭
Design Concepts (3 hours)	⬭	⬭	⬭	⬭
Design Strategies (6 hours)	⬭	⬭	⬭	⬭
Architectural Design (12 hours)	⬭	⬭	⬭	⬭
Human-Computer Interaction Design (10 hours)	⬭	⬭	⬭	⬭
Detailed Design (14 hours)	⬭	⬭	⬭	⬭
Design Evaluation (3 hours)	⬭	⬭	⬭	⬭
Verification & Validation Terminology and Foundations (5 hours)	⬭	⬭	⬭	⬭
Reviews and Static Analysis (9 hours)	⬭	⬭	⬭	⬭
Testing (18 hours)	⬭	⬭	⬭	⬭
Problem Analysis and Reporting (5 hours)	⬭	⬭	⬭	⬭
Process Concepts (3 hours)	⬭	⬭	⬭	⬭
	⬭	⬭	⬭	⬭

Process Implementation (8 hours)	◯	◯	◯	◯
Project Planning and Tracking (8 hours)	◯	◯	◯	◯
Software Configuration Management (6 hours)	◯	◯	◯	◯
Evolution Process and Activities (8 hours)	◯	◯	◯	◯
Software Quality Concepts Culture (2 hours)	◯	◯	◯	◯
Process Assurance (4 hours)	◯	◯	◯	◯
Product Assurance (4 hours)	◯	◯	◯	◯
Security Fundamentals (4 hours)	◯	◯	◯	◯
Computer and Network Security (8 hours)	◯	◯	◯	◯
Developing Secure Software (8 hours)	◯	◯	◯	◯

10. What other knowledge units (not included in the SEEK) would you include in an undergraduate software engineering curriculum? *

Recommendations for Undergraduate Software Engineering Curricula

11. How important are the following Wikipedia articles for an undergraduate software engineering curriculum? *

These articles were among the most popular Wikipedia references in Stack Overflow posts, which are either insufficiently covered or not covered at all by the SEEK.

Mark only one oval per row.

	Not At All	Slightly	Significantly	Extremely
ISO 8601	◯	◯	◯	◯
Android (operating system)	◯	◯	◯	◯
UTF-8	◯	◯	◯	◯
Trie	◯	◯	◯	◯
Endianness	◯	◯	◯	◯
Cross-origin resource sharing	◯	◯	◯	◯
JSONP	◯	◯	◯	◯
Levenshtein distance	◯	◯	◯	◯
JSON	◯	◯	◯	◯
Ajax (programming)	◯	◯	◯	◯
Fisher–Yates shuffle	◯	◯	◯	◯
Cron	◯	◯	◯	◯
ASCII	◯	◯	◯	◯
Post/Redirect/Get	◯	◯	◯	◯
Data URI scheme	◯	◯	◯	◯
Comet (programming)	◯	◯	◯	◯
Template method pattern	◯	◯	◯	◯
HSL and HSV	◯	◯	◯	◯
Windows-1252	◯	◯	◯	◯
Executable and Linkable Format	◯	◯	◯	◯

12. How important are the following topics (not included in the SEEK) for an undergraduate software engineering curriculum? *

These topics were found to be partially covered by the SEEK.

Mark only one oval per row.

	Not At All	Slightly	Significantly	Extremely
Algorithms	⬭	⬭	⬭	⬭
World Wide Web	⬭	⬭	⬭	⬭
Computer Graphics	⬭	⬭	⬭	⬭
Specific Software Tools and Systems (e.g., Database Management Systems)	⬭	⬭	⬭	⬭

13. How often should undergraduate software engineering curricula of universities be updated? *

Mark only one oval.

⬭ Every year

⬭ Every 3-4 years

⬭ Every 5-7 years

⬭ Every decade

⬭ Never

Demographics

14. What is your gender identity? *

Mark only one oval.

- ◯ Prefer not to submit
- ◯ Female
- ◯ Male
- ◯ Other: _____

15. What is your highest (completed) level of education? *

Mark only one oval.

- ◯ High school diploma
- ◯ Bachelor's degree
- ◯ Master's degree
- ◯ Ph.D. degree

16. In case you've graduated from higher education, what university is your most recent degree from?

With "higher education" we refer to any schooling beyond high school. Please specify the name of the university.

_____

17. In case you've graduated from higher education, what was your major field of study?

With "higher education" we refer to any schooling beyond high school.

_____

Demographics

18. How many years have you been practicing software engineering professionally? *

_____

19. What is the name of your current organization (where you're occupied at)? *

_____

20. What is your current job title? *

_____

Survey Feedback

21. Do you have any comments on the questionnaire?

_____

_____

_____

_____

_____

22. Would you like to receive a report with the survey results? If so, please leave your e-mail.

By providing your e-mail you consent to be notified of the survey results. Your e-mail will not be publicized, distributed, or used for any other purpose.

_____