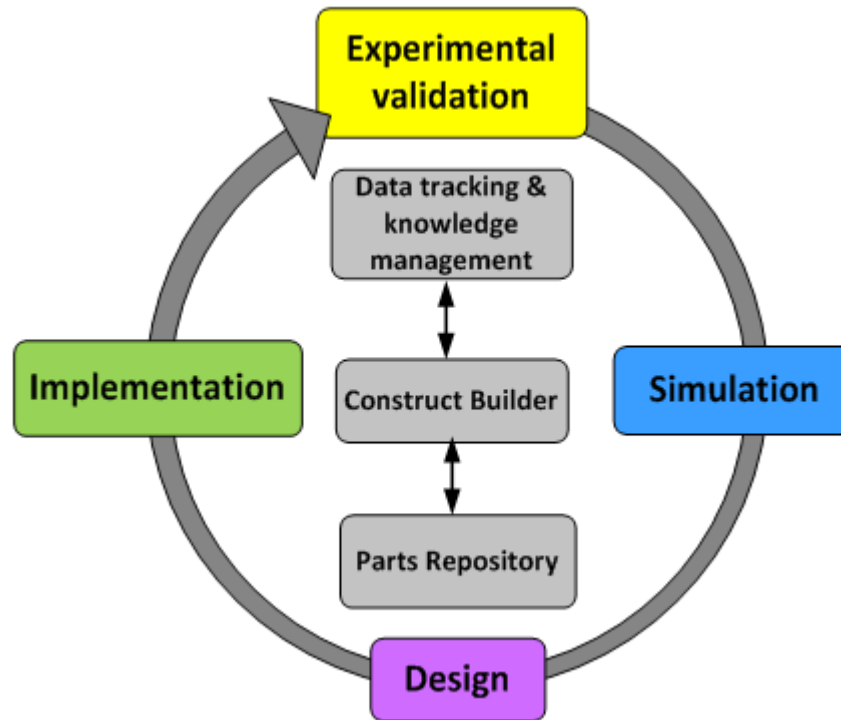


Definicija sintezne biologije

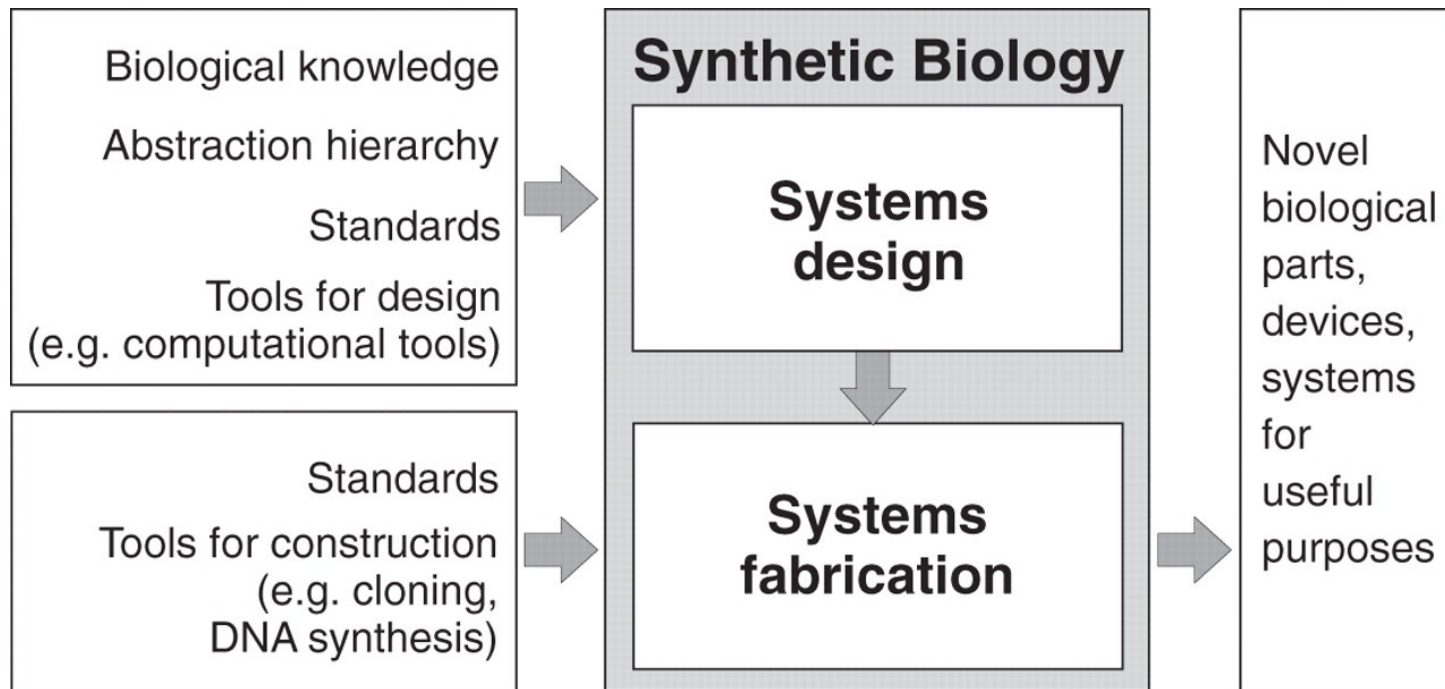
SB je načrtovanje in konstruiranje novih bioloških delov, naprav in sistemov ter preurejanje obstoječih naravnih bioloških sistemov za uporabne namene.

<http://syntheticbiology.org/>

Sintezna biologija: veda na stičišču biologije in inženirstva



Synthetic Biology encompasses systems design and fabrication.



Heinemann M , and Panke S Bioinformatics 2006;22:2790-2799

Bioinformatics

Sintezna biologija in sorodne vede

Molekularna biologija: razumevanje življenja na molekulski ravni

Biologija sistemov: študij interakcij med sestavnimi deli bioloških sistemov, s čimer razjasnimo funkcijo in obnašanje sistema, ki ga preučujemo (metabolična in signalna vezja): holistični pristop

Bionanotehnologija: nanonaprave in nanodelci za raziskave v biologiji, pa tudi razvoj nanonaprav, ki se zgledujejo po bioloških sistemih.

Tehnologija DNA: orodja za raziskave na različnih področjih

Molekularna biotehnologija: uporaba molekularne biologije v temeljnih raziskavah in aplikativnih postopkih v biotehnologiji

Biološko inženirstvo: uporaba bioloških konceptov in metod ter inženirskih pristopov za reševanje problemov, povezanih z vedami o življenju (pogosto z zdravjem), pri čemer upoštevajo tudi načela praktičnosti in ekonomičnosti.

Zgodovina sintezne biologije

MINDING NATURE 3.1

Synthetic Biology: Origin, Scope, and Ethics

By JOACHIM BOLDT

J. Loeb (1906): Naravoslovje bo lahko razumelo biološke procese samo, če bo mogoče pojave v živem svetu v celoti reducirati do najosnovnejših sil in zakonov. Nato bi življenje ustvarili na novo iz neživih sestavin (abiogeneza).

J.B.Burke (1906): Obstajati mora nek prehod med neživim in živim. Naloga biologije je, da z eksperimentom ustvari t.im. ‚animalkule‘. Knjiga „The origin of life“.

S. Leduc (1912) Razen metod analize, sestavljanja dejstev in klasifikacije obstaja v znanosti tudi metoda sinteze, ki poskuša poustvariti opažene pojave in to na ponovljiv način in na osnovi pravil. Knjiga z naslovom „Sintezna biologija“.

Wacław Szybalski: In vivo and in vitro initiation of transcription. Adv Exp Med Biol 44(1), 1974, pp. 23-24

„doslej delamo v okviru deskriptivne faze molekularne biologije. [...] Toda resnični izziv se bo začel, ko bomo vstopili v sinteznobiološko fazo raziskav na našem področju. Takrat bomo razvili nove kontrolne elemente in te nove module dodali v obstoječe genome ali sestavili povsem nove genome. To bi bilo področje z neomejenim potencialom in skoraj brez omejitev pri izgradnji ‚novih boljših kontrolnih vezij‘ in [...] končno drugih ‚sinteznih‘ organizmov [...]“

Szybalski W, Skalka A: Nobel prizes and restriction enzymes.
Gene 4(3), 1978, 181-2

„Delo z restrikcijскими endonukleazami nam omogoča ne le, da konstruiramo molekule rekombinantne DNA in analiziramo posamezne gene, pač pa nas je popeljalo v dobo ‚sintezne biologije‘, kjer ne samo da opisujemo in analiziramo obstoječe gene, temveč lahko konstruiramo in evalviramo tudi nove razporeditve genov.“

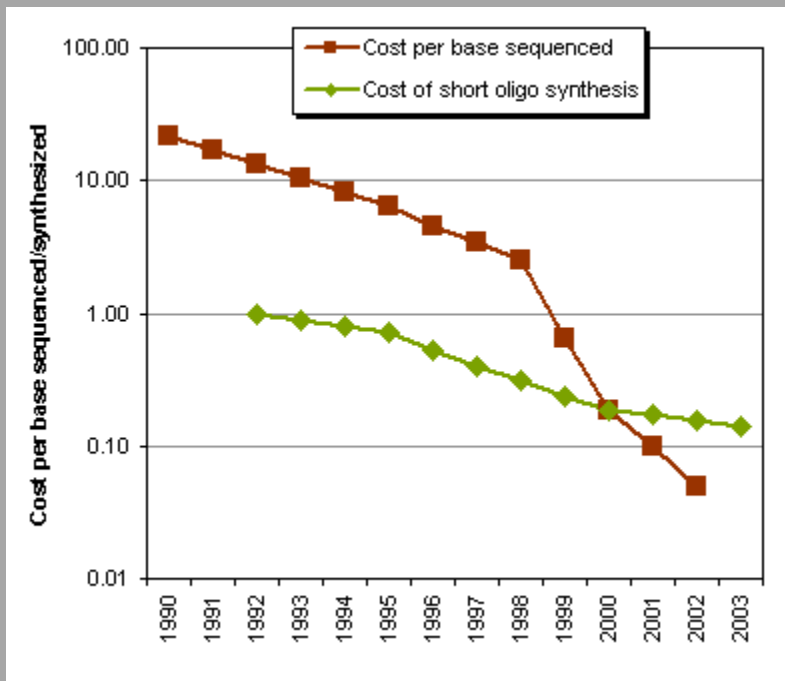
Steven A. Benner, A. Michael Sismour: Synthetic biology. Nat. Rev. Genet. 6(7), 2005, pp. 533-543

„Sintezni biologi so dveh glavnih vrst. Eni uporabljajo nenaravne molekule, da z njimi poustvarjajo pojave, ki smo jih razbrali iz naravne biologije, in to z namenom, da bi ustvarili umetno življenje. Drugi iščejo zamenljive dele iz naravne biologije, da bi jih sestavili v sisteme, ki se obnašajo nenaravno. Skupno pa jim je to, da sintezni cilj sili znanstvenike, da prečkajo neznan teren in se spopadejo s problemi, ki se jih je težko lotiti z analizo, ter jih rešijo. To vodi k razvoju novih paradigem na načine, ki so z analizo težko dosegljivi. Sintezna biologija nam je dala diagnostična orodja, ki izboljšujejo nego pacientov z infektivnimi boleznimi, pa tudi naprave, ki oscilirajo, se plazijo in se igrajo križce in krogce.“

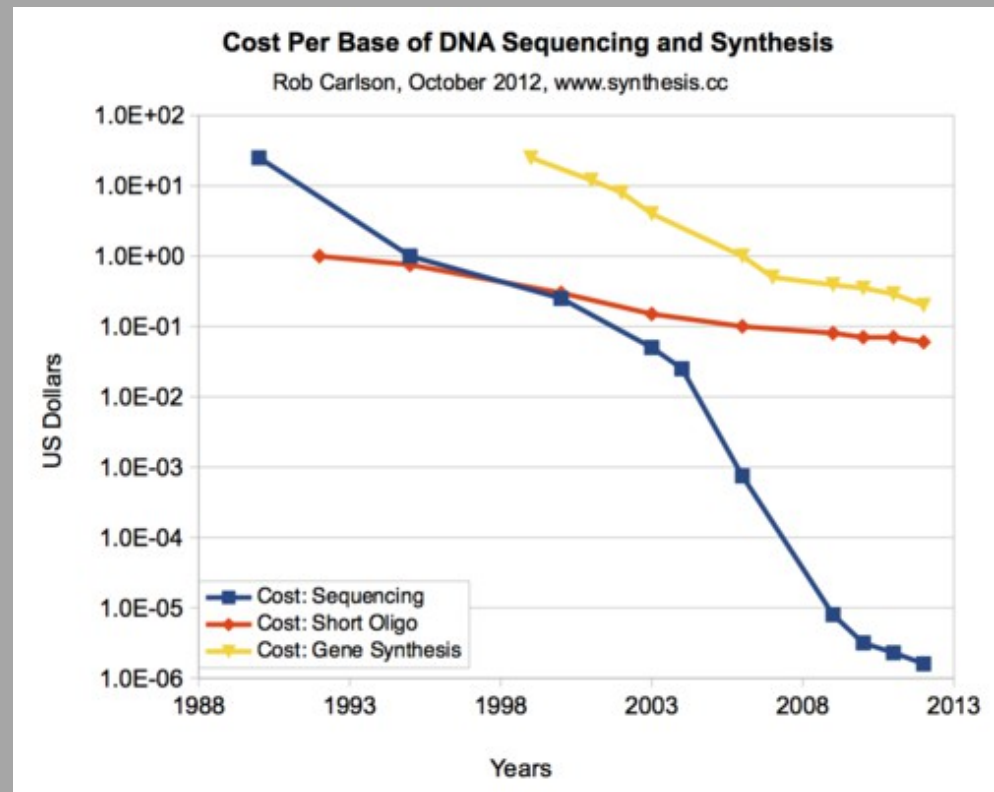
SYNTHETIC BIOLOGY

Steven A. Benner and A. Michael Sismour

Abstract | Synthetic biologists come in two broad classes. One uses unnatural molecules to reproduce emergent behaviours from natural biology, with the goal of creating artificial life. The other seeks interchangeable parts from natural biology to assemble into systems that function unnaturally. Either way, a synthetic goal forces scientists to cross uncharted ground to encounter and solve problems that are not easily encountered through analysis. This drives the emergence of new paradigms in ways that analysis cannot easily do. Synthetic biology has generated diagnostic tools that improve the care of patients with infectious diseases, as well as devices that oscillate, creep and play tic-tac-toe.



Carlson, R. (2003). The pace and proliferation of biological technologies. *Biosecurity and Bioterrorism: Biodefense Strategy, Practice and Science*, 1(3), 203-214





Synthetic Biology

based on standard parts

2003: enomesečni poletni tečaj sintezne biologije na MIT
2004: 5 tekmovalnih ekip
2005: 13 ekip, prvič tudi evropska (ETH, Cambridge) in kanadska
2006: iGEM, 32 ekip
2007: 54 ekip
2008: 84
2009: 112
2010: 130
2011: 165
2012: 191
2013: 204

Synthetic Society Working Group

Delovna skupina za sintezno družbo

2006/7, ZDA

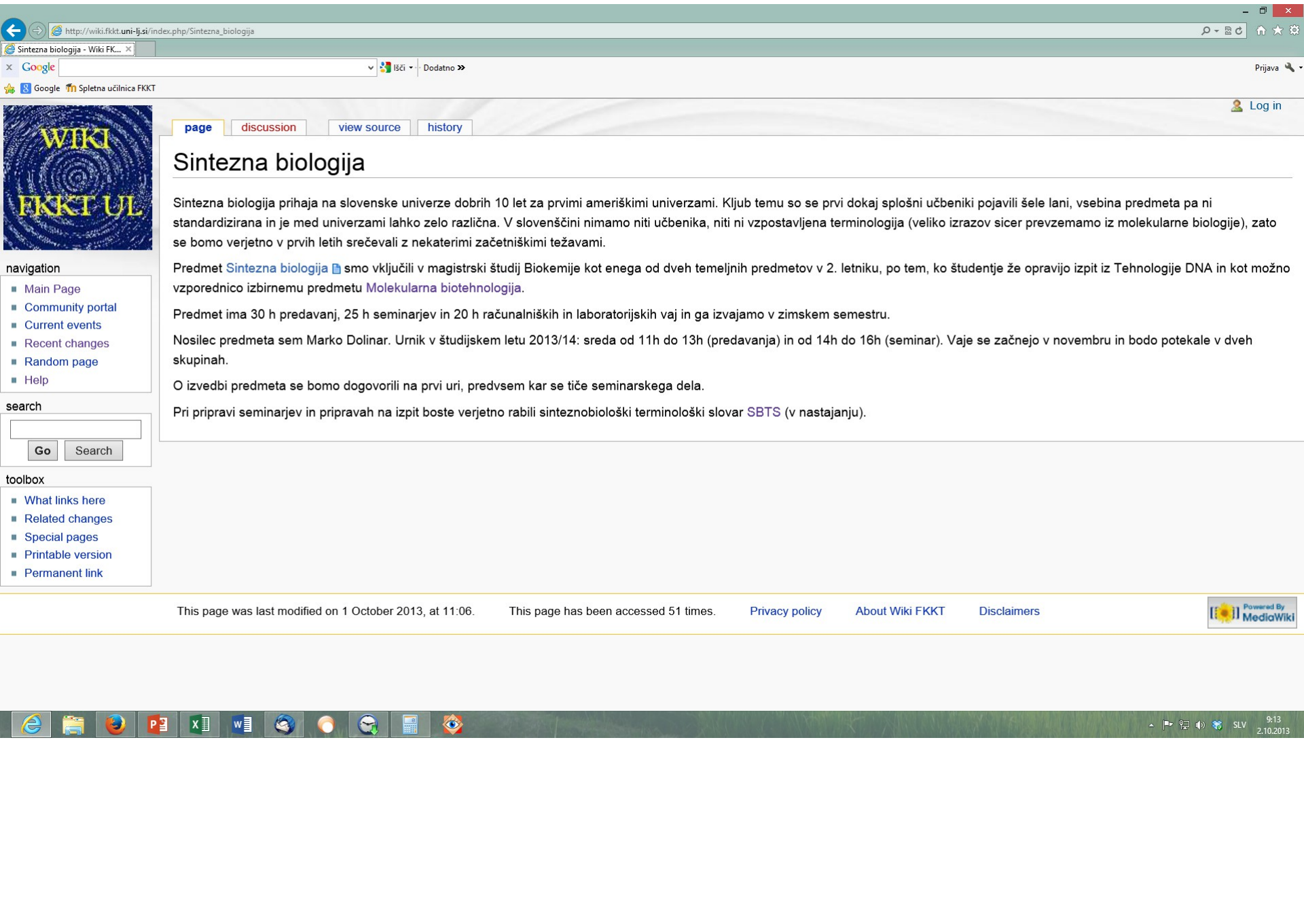
http://openwetware.org/wiki/Synthetic_Society

Ukvarjala se je z družbenimi vidiki sintezne biologije, hkrati pa je organizirala razprave in skrbela za vire, preko katerih bo mogoče širiti razumevanje in sprožati razmisleke o sintezni biologiji.

- sestanki delovne skupine in skupna kosila
- teme na konferencah (SB 2.0)
- razprave na tekmovanju iGEM



EU: 2006-7, projekt FP6



page discussion view source history

Sintezna biologija

Sintezna biologija prihaja na slovenske univerze dobrih 10 let za prvimi amerškimi univerzami. Kljub temu so se prvi dokaj splošni učbeniki pojavili šele lani, vsebina predmeta pa ni standardizirana in je med univerzami lahko zelo različna. V slovenščini nimamo niti učbenika, niti ni vzpostavljena terminologija (veliko izrazov sicer prevzemamo iz molekularne biologije), zato se bomo verjetno v prvih letih srečevali z nekaterimi začetniškimi težavami.

Predmet **Sintezna biologija** smo vključili v magistrski študij Biokemije kot enega od dveh temeljnih predmetov v 2. letniku, po tem, ko študentje že opravijo izpit iz Tehnologije DNA in kot možno vzporednico izbirnemu predmetu **Molekularna biotehnologija**.

Predmet ima 30 h predavanj, 25 h seminarjev in 20 h računalniških in laboratorijskih vaj in ga izvajamo v zimskem semestru.

Nosilec predmeta sem Marko Dolinar. Urnik v študijskem letu 2013/14: sreda od 11h do 13h (predavanja) in od 14h do 16h (seminar). Vaje se začnejo v novembru in bodo potekale v dveh skupinah.

O izvedbi predmeta se bomo dogovorili na prvi uri, predvsem kar se tiče seminarskega dela.

Pri pripravi seminarjev in pripravah na izpit boste verjetno rabili sinteznobiološki terminološki slovar **SBTS** (v nastajanju).

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VAJE (20 h)

Laboratorijski vaji:

1. Standardizirani postopek kloniranja z vektorjem pSB
2. Merjenje relativne moči promotorjev

Računalniške vaje:

3. Bioinformatična orodja v sintezni biologiji
4. Modeliranje bioloških procesov
5. Ustvarjanje in urejanje wiki-strani

4. ŠTUDIJSKA LITERATURA

Fu, Latterich & Panke: Systems biology and synthetic biology, John Wiley and Sons, ISBN-13: 978-0471767787 (izide avgusta 2008)

Synthetic Biology - A Primer [Paperback]
Paul S. Freemont (Editor), Richard I. Kitney (Editor)
World Scientific Publishing; 1st edition (July 23, 2012)

Synthetic Biology: Tools and Applications [Hardcover]
Huimin Zhao (Editor)
Academic Press; 1 edition (June 4, 2013)

5. OBVEZNOSTI ŠTUDENTA

Pri končni oceni štejeta seminar in wiki-stran 25 %, sodelovanje pri seminarjih 10 % in odgovori na izpitna vprašanja 65 % končne ocene. Izpit je pisni in ustni. Delo na praktičnih vajah se oceni na izpitu iz teoretičnih vsebin. Ocenjevalna lestvica je takšna, kot jo predpisuje pravilnik o ocenjevanju.

Na pisnem delu izpita morate doseči vsaj 55 % točk, da lahko pridete na ustni del izpita. Kot ocena za izpitna vprašanja šteje pisni del 60 %, ustni del pa 40 %.

Primer:

Pisni del izpita: 62 % (ocena 6)

Ustni del izpita: 8+ (=8,25)

Ocena izpita: $6 \cdot 0,6 + 8,25 \cdot 0,4 = 3,6 + 3,3 = 6,9 \rightarrow 7$

Seminar: 9- (=8,75)

Sodelovanje: 8-9 (=8,5)

Končna ocena predmeta: izpit ($7 \cdot 0,65$) + seminar ($8,75 \cdot 0,25$) + sodelovanje ($8,5 \cdot 0,1$) =
 $= 4,55 + 2,19 + 0,85 = 7,59 \rightarrow 8$



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Jump between entries with ease

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One-click setup

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See all new users.

OWW Community Blog



Contribute for a strong synbio community
 The BioBricks Foundation (BBF) is a public-benefit organization advancing synthetic biology to benefit all people and the planet.

BioBricks Foundation Synthetic Biology 6.0 Conference announced: July 9-11, 2013

Dear SynBio Community Members: The BioBricks Foundation is pleased to announce The BioBricks Foundation Synthetic Biology 6.

Winners of BioBricks/OpenWetWare Improvement Survey

Dear OpenWetWare Community, Thank you for your participation in the OWW improvement survey. We thank you for all your valuable input toward making OpenWetWare one of the most effective tools to facilitate your research.



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 - 4.1 Computational modeling

MeSH Review

[edit this page]

Synthetic Biology

Limas, M.N., Sarkar, A., Ramana, C.V., Fernandes, P., Dolinar, M., et al.

1. Introduction

Synthetic biology (SynBio) aims to: a) design and engineer biologically based parts, novel devices and systems not found in nature and b) re-design existing natural biological systems for useful purposes ^{[1][2]} SynBio strives to make the engineering of biology easier and more predictable ^[3] and is influenced by a wide variety of fields such as genetic engineering, biochemistry, bioinformatics, microbiology and nanotechnology ^{[3][4][5]}.

Erwin Schrödinger, a Nobel Laureate for his work on quantum physics, was intrigued by how life seemed to create order in a molecular level while the entropy of the universe continued increasing. Moreover, living things could pass on that order from one generation to the next. His article '*What Is Life?*' inspired James Watson and Francis Crick and the subsequent discovery of DNA. Though there was no unanimous definition of DNA, life scientists decided that it was a self-sustaining chemical system capable of undergoing Darwinian evolution ^[6]. Scientists began to understand life as a system, consisting of building blocks which again arose from molecular complexes. Hence, the conventional approach to biological research has been to isolate a few genes or proteins in order to understand their structure and function. The understanding that biological systems are multi-level and multi-scale has led to a realization that biological systems can no longer be studied using a reductionist approach (assuming that single biochemical events result in single effects). In fact, there is a complex network of interactions between biological components (*e.g.* genes, proteins), with positive and negative feedback loops that regulate their operation. This systems approach led to the emergence of systems biology, as well as synthetic biology ^[6].

SynBio has the potential to produce clean fuel in an efficient and sustainable manner ^[7], to fabricate practical organisms that could clean hazardous waste in inaccessible places ^[8], to recognize and destroy tumors ^[9], to produce newer analogues of existing drugs with more specificity and less side-effects ^[10], to use plants to sense chemicals and respond accordingly ^{[11][12]} and a wide range of other applications.

In the field of energy, SynBio is being used to develop much more efficient biofuels, which have the potential to alleviate current problems like competition for land use between energy and food crops ^[7]. The actual process of deriving biofuels from crops such as sugar cane or palm oil wastes around 90% of the biomass. SynBio derived biofuels are being developed in order to use a much higher percentage of the biomass, leading to a significant increase in yields and carbon savings ^[7].

In health, the synthetic anti-malarial drug artemisinin - which is being developed using SynBio techniques - could be produced in large scale and have a major impact on the treatment of malaria in the developing world. Also, the cost of treatment should be low as the development of the drug is being funded by the Gates Foundation ^[13] ^[7].

Whether addressing an existing problem or creating new capabilities, efficient solutions can be

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SBTS

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Sinteznobiološki terminološki slovar

Tu bo postopno rasel sinteznobiološki angleško slovenski slovar. Morebitne nove izraze vpisujte sami in če imate predlog za prevod, vpišite tudi tega. Da bomo vedeli, kateri izrazi so novi, jih vpišite *poševno*.

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A

- abstraction - abstrakcija, abstrahiranje
- amplification - pomnožitev (DNA)
- amplitude - amplituda
- annotation - anotacija
- assembly - sestav?, sestavljanje

B

- biobrick - biokocka
- BioBrick(R) - BioBrick(R) (zaščiteno ime - ne prevajamo)
- biosafety - biološka varnost
- biosecurity - biološka varnost ?
- bottom-up - od spodaj navzgor

C

- circuit - vezje

D

- decoupling - razklop

E

F

G

- gate - vrata

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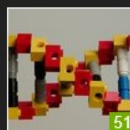
I

J

K

L

- logic circuit - logično vezje
- logic gate - logična vrata



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Synthetic Biology

Selected news covering the exciting field of Synthetic Biology

Curated by Marko Dolinar

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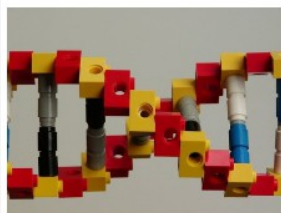


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Triton Algae Raises \$5M



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Triton says it has developed a synthetic biology platform that also uses algae to produce “high value” proteins. The company says it already is producing complex proteins, enzymes, and other biologics that are cost-effective and can be immediately used in agricultural, pharmaceutical, and other retail markets.

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Book: 'Synthetic Biology and Morality'



From [www.eurekalert.org](#) - Today, 9:47 AM

“Synthetic biology aims to design and build organisms to serve human ends, such as producing inexpensive biofuels and developing new kinds of medicines. But this new form of biotechnology also raises ethical questions.”

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DNA freeware may out-innovate patented genes



From [biomassmagazine.com](#) - September 4, 2:44 PM

With synthetic biology (synbio) rapidly gaining momentum, and a landmark U.S. Supreme Court judgment striking down an age-old biological patenting system, biotechnology companies need to incorporate open-source into their innovation plans in order to succeed in the emerging landscape, according to Lux Research.

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Molecular clowding and synthetic biology

