

Examenvragen 1^{ste} Master Biochemie & Biotechnologie – Semester 1

Beste student, dit document bevat alle examenvragen die bijgehouden zijn doorheen de voorbije jaren. Hou er rekening mee dat sommige onvolledig zijn en dat er een hele hoop ontbreken. We hebben ervoor gekozen ze te ordenen van recent naar oud zodat de meest relevante vragen vanboven komen te staan. Sommige examenvragen dateren van lang geleden (2005-2006 of ouder) en zijn vaak niet erg relevant meer. De reden dat we deze alsnog behouden is omdat ze meestal nog steeds de essentie, belangrijke onderwerpen van de vakken weergeven.

Wil je bijdragen aan ons archief? Via de onderstaande Google Forms link kan je je examenvragen snel en eenvoudig deponeren!

<https://forms.gle/mCu6rZ4Cwm7Gon779>

Voor de masters is het belangrijk om Ufora in het oog te houden. De meeste professoren geven daar duidelijke voorbeeldvragen en documenten die benadrukken welke leerstof belangrijk is en welke niet.

Inhoudstafel

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Jaargang 2019-2020

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Jaargang 2019-2020

Plant Interactions (PLB)

- How can you screen for stringolacton signal/synthesis mutants
- Give at least 3 functions of stringolactons
- Give the signaling pathway
- Give 2 methods that can be used to find more factors involved in the signaling pathway
- Give the essential differences between PC and MT
- How can you adapt plant to be a better zn accumulator
- How can you combine phytochelatins and PGPR to get a better accumulating plant
- Ca-extrusion is the first signal in wounding response
- Enzymatic anti-oxidants are the first and most important factors in ROS homeostasis
- Mechanical Stress
 - o Give the most important hormones involved in mechanical stress. Provide experimental evidence.
 - o Draw the signalling pathway in mechanical stress schematically. Propose an experimental setup to identify unknown components in this pathway.
- Neighbour Sensing
 - o Describe the phenotype of a plant that encounters a neighbour plant.
 - o Illustrate the role of ethylene in neighbour sensing by using relevant mutants.
 - o Schematize the integration of ethylene and light in neighbour sensing. Do not write text, just provide a legend.
- True or False? Explain in max. 2 sentences:
 - o Jasmonates signal abiotic stress by repression of a negative regulator.
 - o Ethylene induces a hypoxia response by stimulation of NO.

Systems biology (general):

- Difference between top-down & bottom-up + ranking of different techniques on top-down-bottom-up scale (3p)
- Random & scale-free networks (+ biological relevance of scale-free NW) (3p)
- Boolean state transition graph + define attractors; what are booleans used for (4p)
- Repressilator + function (4p)
- Explain terms (6p)
 - o Roc curve
 - o Betweenness coefficient
 - o Incoherent feed forward motif
 - o BioBricks
 - o k-means clustering
 - o Benjamini correction

Molecular pathophysiology (BIB):

- Which molecule is this? (vitamin D)
- what are zero-order kinetics and first order-kinetics draw graphs, don't forget to label the axes
- when you have a low prevalence (certain disease) and you want to obtain a high positive predictive value what is more important specificity or sensitivity? Explain
- what genes are correlated with an increased susceptibility to asthma
 - o ADAM33
 - o MBP
 - o IL33
 - o Something I don't remember
- TRUE OR FALSE:
 - o New drugs in diabetes type II treatment breaks down incretins (false)
 - o Chronic kidney failure can both be cause and consequence of atherosclerosis (true?)
 - o NOD2 polymorphisms are associated with an increased risk for crohns disease (true)
 - o Enzymes are usually drugable targets (?)
 - o Leads are molecules that have entered clinical trials (false)
- What happens to the hypertension regulating mechanisms in the body when you inject (bolus injection) a syringe of sodium into your blood
- What are the 5 stages of leukocyte migration
- (key-mechanisms) what are the treatment options for congestive heart failure
- What are 3 ways a stable atherosclerotic plaque can become an unstable lesion?

Programming bio-informatici (BIS):

- <https://realpython.com/quizzes/> [Multiple choice questions for the theoretical part of the exam are mostly derived from this website]
- https://github.ugent.be/pdbleser/PY4BIO_2019 [this GitHub contains all class material & scripts (including mock exams with solutions) from 2019]

Proteomics (BSB):

- De vragen zijn afhankelijk van het gemaakte project:
- Waarom heb je dit artikel gekozen?
- Leg je methode uit
- Uitleg omtrent ESI
- Quad en orbitrap volledig uitleggen
- Gas-cell en fragmentatie uitleggen
- Validatie van bekomen spectra
- FP-rate
- Waarom een proteomics experiment uitvoeren?
- Wat zou je eventueel aanpassen aan je methode?

Jaargang 2018-2019

Virus-Host interactions (Prof Xavier Saelens)

Version 1

- 1) Membrane fusion protein type II. Which viruses use this? What are the characteristics? Explain the conformational changes briefly. (4 points)
- 2) Explain the capping and polyadenylation mechanisms of influenza virus (4 points)
- 3) NS3/4A, explain what this protein does and how you would prove this experimentally (5 points)
- 4) APOBEC, How does this protein inhibit HIV? (4 points)
- 5) Oral exam : explain a slide from the lessons without text (3 points)

Version 2

- 1) RDRP, motif B has a conserved Glycine residue. How would you experimentally prove that this residue plays an important role in the RDRP of poliovirus. 4p
- 2) HTLV tax expression. 4p
- 3) Give an example of viral protein that suppresses the IFN signalling downstream. How would you experimentally prove it? 5p
- 4) HIV, how does it export unspliced miRNA? 4p
- 5) Slide from one of the lectures. 3p

Version 3

- explain everything of jaagsiekte (4)
- compare mRNA making in nidovirales and rhabdoviridae (4)
- explain codon pair biases and give protocol how you would de-optimize the glycoprotein of ebola (4)
- give a protein that interferes with type I IFN and give experiment to prove it (5)
- explain a slide (3)

Proteomics (Bart Devreese)

(Oral exam: all questions based on assignment you have prepared)

- Why we use mostly trypsin digestion?
- Explain why phosphorylation is not observed in HPLC. What type of interactions are observed in HPLC?
- How do we know if a peptide has multiple charge from spectra obtained from ESI?
- What statistical approach do you use to validate the data obtained from MS?
- Why did you change the general design of the project (if you have changed it from pre report to final report) in what aspect the final design is better than first?
- Detailed explanation of the method you choose as your validation method. What method can also be a good validation method for this experiment? Motivate why you make that choice.
- Why is it important identifying PTMs? Describe the method you will use.
- Explain the role of compounds used in sample preparation
- Detailed explanation of MS instruments.

Structure and function of biological macromolecules (Savvas Savvides)

Example exam 13-14 (was on minerva) with extra questions: for example draw gibbs free diagram of mutant W6F and explain, compare total protein folding with I and TS steps.

Systems biology (Steven Maere)

- boolean networks + make transition graph + make wiring pattern + types of 2/3node motifs in this
- explain LLS and WS formula + explain probabilistic data integration
- picture of neg feedback, coherent type 1 FFL, incoherent type 1 FFL
- repressilator + engineering principles
- biobricks, roc curve, bonferroni correction, scale-free networks, biclustering

Plant Functional genomics (Lieven De Veylder & Klaas Vandepoele)

- Compare normal RNAseq and strand specific RNAseq, explain steps of last one, give biological process that can be detected by this
- Give two in vitro TF centered methods
- A: 2 methods to isolate epidermis and mesophyll separately
 - B: GAL4-VP16 system to express gene specifically in mesophyll and epidermis
- Transcript and splice junction link via graph
- Why crosslinking en chr fragm needed in ChIP-seq
- DNaseI
- GO annotation not always correct for unknown proteins, give 2 reasons
- Parameters for size of interactome and explains precision
- CrY2H concept and pipeline
- Two methods to screen target of chemical compound

Food safety and foodmicrobiology (Kurt Houf)

- functional food + example
- child illness in potatoes, give steps in microbial analysis
- VBNC
- direct isolation and isolation after enrichment + advantages and disadvantages
- picture of spiral plating
- 3 isolates of L monocytogenes, 2 with same PFGE band pattern and 1 with another, what can you conclude
- gel van lysate and extraction, explain and applications
- how to determine coliform bacteria in drinking water
- campylobacter species in EU and reservoir en give a sequale
- explain scope

Plant Environment Interactions (Dominique Van Der Straeten)

2 big questions:

- 3 effects van SL + screening assay + SL signalling mechanism
- neighbour sensing: phenotype + what does ethylene + signal scheme with ethylene and light

4 short questions, max 2 sentences:

- jasmonate is the hormone controlling mechanistic stress via repression of a negative regulator
- Ros solely regulated by glutathione and glutaredoxins
- EIN3 is a negative regulator while EIL1 is a positive regulator of the germination of seeds under ground
- LOES in floodtolerant rice is regulated by degradation of type VII ERF and results in ABA signaling

Biomoleculaire productiemethoden (part Nico Callewaert)

- explain a production system (every year another situation, there were 4 methods in the course, he can ask to explain everything, memorize all the chemical terms!)
- deprotection of bases and byproduct of deprotection of a phosphate group and phosphodiester method
- other questions were 1 page or a half page long and are different every year